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PROCEEDINGS OF SHELLFISH SANITATION WORKSHOP, 27-28 AUGUST 1956

Public Health Service
Washington, D. C.

28 August 1956

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PROCEEDINGS

SHELLFISH SANITATION WORKSHOP

August 27-28, 1956

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

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January 1957

FOREWORD

The 1956 Shellfish Sanitation Workshop was arranged by the Public Health Service in accord with recommendations of the 1954 National Shellfish Sanitation Conference.

The Workshop had four major objectives: (1) Presentation of results of recent research in the field of shellfish bacteriology; (2) Apply research results to sanitation procedures; (3) Discuss current administrative problems; and, (4) Consider final changes in the revision of the Manual of Recommended Practice for Sanitary Control of the Shellfish Industry.

Invitations to participate in the Workshop were extended to all State and Territorial Health Departments; Fish and Game Departments in coastal States; Health Departments in major cities; interested Federal agencies; Government of Canada; and industry organizations. The Workshop was attended by fifty-nine persons representative of 34 agencies and/or organizations. A list of participants is appended.

The following proceedings are based on a partial transcript and on the prepared papers. The subject matter in the proceedings has been reviewed by the speakers.

Eugene T. Jensen, Chief
Shellfish Sanitation Section
Milk and Food Program
Division of Sanitary Engineering
Services

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
1956 Shellfish Sanitation Workshop
August 27-28, 1956
Room G-751 - HEW Building
3rd & C Streets, N. W.
Washington, D. C.

Monday morning, August 27, 1956

	CHAIRMAN: Mr. John D. Faulkner,	Chief, Milk and Food Program, Division of Sanitary Engineering Services, Public Health Service
9:30	Opening Remarks	Dr. Otis Andersen, Assistant Surgeon General, Chief, Bureau of State Services, Public Health Service
9:45	The objectives of the 1956 Shellfish Sanitation Workshop, and the formulation of a procedure for future discussion of problems relevant to the administration of the shellfish certification problem	Ten minute introduction to problem by Mr. Robert Brown, Chairman, American Public Health Association Committee on Marine Food and Incrustacea
11:00	Break	
11:15	Discussion of changes in Part II of the revised shellfish sanitation manual based on April 30 review draft, including a final decision on any changes to be made in the draft	Eugene T. Jensen, Chief Shellfish Sanitation Section Milk and Food Program Division of Sanitary Engineering Services Public Health Service
12:00	Lunch	

Monday afternoon, August 27, 1956

	CHAIRMAN: Mr. Robert Brown,	Chairman, American Public Health Association Committee on Marine Food and Incrustacea
1:15	Continuation of manual discussion	
2:30	Use of shellfish growing areas which have been upgraded through construction of sewage treatment works, and a discussion of safeguards needed at such sewage treatment works	Ten minute introduction to problem by Ronald Macomber, Shellfish Sanitation Consultant, Region II, PHS
3:45	Break	
4:00	Treatment of wastes from cabin cruiser and other shipping	Ten minute introduction to problem by Mr. Harold Udell, Chief, Sanitation Unit, New York State Conservation Department
5:30	Adjourn until 9:30 a.m., August 28th.	

Tuesday morning, August 28, 1956

	CHAIRMAN: Mr. David Wallace	Director, Oyster Institute of North America
9:30	Bacteriological examination as an indicator of the sanitary quality of market shellfish	Ten minute discussions of problem by: Mr. C. B. Kelly, Jr., Chief, Shellfish Sanitation Laboratory (Sanitary Engineering Center), Pensacola, Florida Dr. Eugene K. Harris, Robert A. Taft Sanitary Engineering Center, PHS Cincinnati, Ohio Mr. Edwin Ludewig, Director, Bureau of Food and Drugs, New York City Dept. of Health Mr. C. S. Brinsfield, Chief, Division of Food Control, State Department of Health, Baltimore, Maryland Dr. E. T. Bynoe, Chief, Bacteriological Laboratories, Laboratory of Hygiene, Department of National Health and Welfare, Ottawa, Ontario, Canada Dr. Glenn G. Slocum, Chief, Division of Microbiology, Food and Drug Administration, Washington, D. C.
10:45	Break	
11:00	General discussion and decision on bacteriological standards which, if any, should be recommended for use in conjunction with the cooperative program for certification of interstate shellfish shippers	
12:00	Lunch	

Tuesday afternoon, August 28, 1956

	CHAIRMAN: Mr. David Wallace -	Director, Oyster Institute of North America
1:15	Continuation of discussion on bacteriological standards	
3:45	Break	
4:00	The Effect of Chlorotetracyclene in the Processing and Storage of Fresh Shucked Oysters	Dr. S. D. Upham, Director, Product Development, Fine Chemicals Division, American Cyanamid Company
5:00	Summary	Mr. John D. Faulkner, Chief Milk and Food Program
5:30	Adjournment	

Monday morning - August 27, 1956 - 9:30 A.M.

CHAIRMAN: Mr. John D. Faulkner

MR. FAULKNER: I would like to welcome you to the first Shellfish Sanitation Workshop, and to express our appreciation for your participation. Our shellfish activities are a function of the Division of Sanitary Engineering Services which is a component of the Bureau of State Services. The primary purpose of this Bureau is to provide assistance to the States with their public health problems. This is accomplished through provision of technical assistance and the conduct of other activities such as the cooperative shellfish certification program. I would now like to introduce Assistant Surgeon General Otis L. Anderson, Chief of the Bureau of State Services.

DR. ANDERSON: Mr. Faulkner, Friends. The shellfish sanitation program is one of the oldest engineering activities of the Service and according to the absence of shellfish caused disease is a very effective one. It is gratifying to be a partner in such a program, and to open this meeting to discuss shellfish sanitation problems.

An international flavor is given by the presence of several representatives from the Canadian Department of National Health and Welfare. A few weeks ago one of our national weekly news magazines described how freely people cross the international boundary between the United States and Canada. Thanks to our mutually accepted certification program, shellfish enjoy about equal rights, and there is a substantial bilateral shellfish trade between the two countries. In fact the certification system which we now use was originally suggested by the Canadian Department of Health. I am, therefore, very pleased to welcome our Canadian colleagues and to pay tribute to the fine spirit of international cooperation which makes this exchange of technical information possible.

Cooperation is, in fact, the hallmark of the certification program. As you know, the program is not based upon a specific law. Its effectiveness is determined entirely by the cooperation of the several State and Federal agencies having an interest in the sanitary control of shellfish. The scope of this interest is, I think, shown by the number of agencies represented here today. It is further indicated by the fact that Mr. David Wallace of the Oyster Institute of North America will be your Chairman for the important discussions on shellfish bacteriology on Tuesday.

The Public Health Service recognizes its responsibilities in the certification program. We have maintained an almost continuous research program in shellfish bacteriology and anticipate these research activities will be continued. Special studies on paralytic shellfish poisoning have been carried on at the Sanitary Engineering Center for several years. Substantial progress has also been made in this field.

We plan, of course, to continue routine evaluations of State shellfish sanitation programs, and to publish lists of shippers who are certified to us by the States with approved programs.

In all of our shellfish sanitation activities we will continue to maintain close liaison with the interested State and Federal agencies and with the shellfish industry. An important objective of this Workshop is to develop methods for maintaining even better liaison between the States, the shellfish industry, and the Public Health Service.

At the start of the 1954 Shellfish Sanitation Conference, Surgeon General Scheele made a suggestion which I think is just as pertinent today as it was two years ago. He suggested that we approach all of our discussions with an open mind--not necessarily accept the fact that everything as we do it is necessary, or adequate and proper. Neither should we necessarily accept the fact that they are inadequate or improper. In other words, be continually alert to new and more efficient techniques. Such an open-minded approach is essential to progress.

I know from my experience as Chairman of the 1954 Shellfish Sanitation Conference that you have a very full two days of discussions ahead of you, and that you are anxious to get on with your technical discussions. Therefore, I will again tell you how pleased we are to have you here.

MR. FAULKNER: Mr. Mark D. Hollis is Chief of the Division of Sanitary Engineering Services. He is unable to be here this morning; however, we are fortunate to have with us Mr. Gilbertson, Assistant Chief of the Division. He will discuss the relation of the new Water Pollution Act to our shellfish activities.

MR. GILBERTSON: Thank you, John. I know Mr. Hollis would have been especially happy to have been here. He grew up in Georgia and his earliest public-health employment was with the Hampton Roads survey. He has a long and substantial interest in the shellfish activity.

I should mention that I have been much impressed with what John Faulkner and Gene Jensen have been doing in shellfish with a small staff--actually only three professional people. There has been some criticism of the Service activities because we haven't been able to do more. I am thinking particularly of the Gulf Coast and West Coast areas.

With respect to the Water Pollution Control Act, there is a ray of hope here which I think is of substantial interest to the shellfish industry.

This Act is an extension of the Act of 1948 which expired June 30. The new Act is broader and more comprehensive. It strengthens provisions for research and for technical assistance to the States, industries, and cities. This new Act also provides for research grants and contracts to public and private institutions throughout the country. This would encourage additional groups to conduct research on water pollution problems--not only with complex industrial wastes but with municipal sewage. There are also provisions in the Act to strengthen training activities through short courses in Cincinnati and through research fellowships and other training grants. All of these authorizations should be very helpful in stimulating interest and strengthening water pollution control programs throughout the country.

The section of this Act which is probably of greatest current interest to this group is the construction section--Section 6. This is a new provision which was not in the Bill as originally submitted, but which was added in the hearings in the House. It provides for Federal grants to municipalities for actual construction of sewage treatment works; that is, abatement of pollution control Section 6 provides that a grant of $250,000 or 30%, whichever is the lesser may be made to a project provided it meets certain requirements. It must be a part of a comprehensive water control program. It must be approved by the State as a part of the State plan. Plans and specifications must be approved by the State. It should meet one of several criteria which are being established by the Public Health Service. These criteria relate to the questions of interstate and international pollution, impact of Federal activities, and public health. "Public health necessity" is of direct interest to the shellfish industry. This criteria, of course, would also apply to public water supply problems and recreational use of water.

We have received hundreds of inquiries from cities and States and we are in the process of trying to get this construction part of the pollution control program going as rapidly as possible. Meetings have been held throughout the country in our Regional Offices with representatives of the State water pollution control agencies. The objective is to get first hand information from the State agencies on how this program can best be operated to fulfill water pollution control needs.

I thought it would be worthwhile to mention this pollution control program and to point up parts which are of interest to this group. We hope that as progress is made abd various parts of this new Act are implemented by Public Health Service and by the responsible State agencies, that the overall effect will be to clean up some of the areas which have been a problem to the shellfish industry, as well as to other areas which are having trouble with pollution. Thank you very much.

MR. FAULKNER: As most of you know the 1954 National Shellfish Sanitation Conference which reviewed the State-Public Health Service-Industry cooperative program was the first such meeting in 25 years. It was pointed out by those in attendance that steps should be taken to get the State, industry and city people together more frequently to discuss problems we are all facing in our shellfish sanitation activities. The Public Health Service has arranged this Workshop to implement the recommendation for more frequent conferences. The Association of State and Territorial Health Officers has endorsed the Workshop plan and is represented here today by Dr. Mack Shanholts, the Virginia State Health Officer.

There are a few points I would like to emphasize in order to establish perspective. As Dr. Anderson has said, this is a voluntary program. The basis for Public Health Service participation is our function of provision of general technical assistance to the States. The Manual of Shellfish Sanitation was not developed as a model law. It is not a recommended ordinance and code like the Milk Ordinance and Code. Its purpose is to provide a common yardstick or minimum sanitary requirements. It represents the best judgment of the people who developed it, and it includes the technical views of the States participating in the program.

The manual is the basic guide for the cooperative certification program. Supervision and certification are the responsibilities of the States. The Service has only the responsibility of evaluating and endorsing State programs and of publishing a list of those shippers which have been certified by the States to the Public Health Service.

Canada participates in the program under a bilateral agreement between our two Governments, which provides for equivalent sanitary standards to be used in both countries.

I have mentioned these points because all have an important bearing on our approach to the items on the agenda. All States have been invited to be present at this meeting. I do not think any of the interior States, other than Pennsylvania, are represented. However, we did receive a number of letters from the interior States commending the certification program. In this connection, I would like to read a paragraph from a letter received from the Ohio State Department of Health:

> "In reviewing the program which you attached to your letter, it appears that the meeting should be an interesting one and I would have nothing to suggest that Ohio would like to have added to the agenda. I might add at this point, that as far as we are concerned this program is working well and we are quite happy with it. I am sure that the people who are more directly involved with the actual operation of this program would have many problems that we in Ohio would not share. On the other hand, I do hope that nothing comes out of this meeting or subsequent meetings on this subject which would encourage any basic change that might result in reciprocity problems."

I would now like to introduce Mr. Robert Brown. As most of you know, he is the Chief of the Bureau of Environmental Hygiene, Maryland State Department of Health. He is also the chairman of the American Public Health Association's shellfish committee.

Mr. Brown spoke from a prepared paper. He discussed technical and administrative problems faced in the cooperative program for the certification of interstate shellfish shippers. Two actions were suggested: (1) Establishment of an advisory committee to the Public Health Service; and (2) PHS development of a guide for administration of the program. His complete paper is included as Appendix A, page 47.

MR. FAULKNER: The points which Mr. Brown has brought out, especially those concerning the use of an advisory body, are ones which we feel should be thoroughly considered by this group. We hope we will have adequate discussion and get decisions on those problems to the satisfaction of the majority of those attending. We will therefore proceed with a discussion of Mr. Brown's proposals, particularly those which are not down as agenda items. In my opinion Bob has made some interesting and far reaching proposals.

MR. BROWN: Number one is the most important of these problems. I would like to point up a specific problem that came up last year regarding the shipments of shellfish to New York City as an example of the need for such a group. I am particularly desirous that my remarks not be considered critical in any respect. The problem that came to me had to do with certified plants that were apparently being denied opportunity to ship into a given area because, on arrival, the product did not meet a given standard. I did not question the right of any area to set up standards for the product to meet, but to indicate further that a plant which had been certified under a national program could not make shipments to that area is an infringement on the program itself. There is no present method with which matters of this sort can be dealt with expeditiously. It would help us considerably in my judgment, if we had such a review body, as outlined in the discussion, to which matters of this sort could be immediately referred and working decisions reached. Otherwise the whole problem of how to handle a critical matter confronting the program, or even the existence of the program, has to await a national conference, or considerable correspondence. I would like to know what other members of the group think about this type of consideration?

MR. FAULKNER: Any views on this point?

DR. BYNOE: Mr. Brown raised a point which might well apply between the U. S. and Canada. The first question I would ask is whether this committee would have any authority or is purely advisory? The illustration he used is not applicable unless you are operating under a law. How could the committee require an area to meet a standard? This committee would have to have the legal approval of all participating States and countries to accept one standard. Where a State or country has the legal right to set its own standard, how can a committee obviate this difficulty? We could still have New York City, or Canada, saying that they would not admit the shellfish unless it meets their standard. How can the committee get far unless everybody agrees with a certain standard? We have our own standards in Canada. Personally I think it would be wonderful if everybody would agree on one standard.

MR. FAULKNER: Bob, would you care to answer. How would you visualise the committee's function?

MR. BROWN: As Dr. Bynoe points out, it isn't a question of determination of a standard, but of what these standards for the program should be. For example, shellfish from different areas have different characteristics. The program, as it is presently operated, does not recognize that there is a difference with regard to shellfish characteristics and procedures, etc., in these various areas. It could be a function of this committee to work out the various standards which were to be observed in the program. This would not be a program which was written up for the Service but rather on our behalf. We would devise a committee which would work for State interests, in collaboration with the Service, in setting standards for the program.

MR. FAULKNER: Any one else?

MR. WALLACE: There is another reason for such a committee. As a specific instance, during the past year and one-half the Service has been trying to revise the shellfish sanitation manual. It seems to me that a committee such as this could have simplified, to a very considerable extent, the mechanics of this task. It has required many readings and a great deal of correspondence and revision after revision to reach the final stage. Much of this could be accomplished by such a committee.

MR. FAULKNER: We have recently completely reorganized our existing advisory board structure. Previously we had one formal advisory board known as the Public Health Service Milk and Food Sanitation Advisory Board. Also, from time to time, we had an ad hoc shellfish advisory group. As a result of an evaluation of the effectiveness of these advisory bodies, we recommended the Surgeon General abolish our old advisory board and approve the principle of setting up categorical boards. We are now setting up the first of these--the Food Establishment Sanitation Advisory Committee. This Committee, with a membership of 15, will be made up of representatives from the major health and sanitation organizations including the Association of State and Territorial Health Officers, the Conference of State Sanitary Engineers, International Association of Milk and Food Sanitarians, National Association of Sanitarians, representatives from a number of States and city health departments and from industry. The committee also has two technical consultants from universities--one from a school of public health and the other from a university doing food technology research.

We also plan to set up a Milk Sanitation Advisory Committee, and are considering an advisory group for the shellfish program.

Incidentally, Mr. Brown did not include a representative of Canada in his proposal on an advisory group. The Canadians are basically a part of the certification program. What we do and what they do affects the program under the terms of our bilateral agreement. We would have to have representation from Canada.

Here is a situation in which there is a cooperative program of the States, Public Health Service, and industry. Therefore the role that Mr. Brown outlined for this committee would probably have a greater impact than the other types of advisory committees which I have mentioned. This might govern your thinking on how you would like, administratively, to establish such a committee. For example, if it was appointed by the Surgeon General it would be advisory only. We in the Service feel that there is a need for an advisory group. Whether it is to be appointed by the Surgeon General, or is an ad hoc group is a point which should be settled here. We would like, from the Service point of view, to have your recommendation for our guidance.

MR. BROWN: My omission of a Canadian representative was not a matter of oversight. I recognize the fact that there is a very definite relationship between the U. S. Public Health Service and the Canadian Ministry of Health. It would be intended that the liaison between the Canadian health group and the U. S. Public Health Service would continue as it now exists and certainly it would be a reflection of the interests of our colleagues in Canada the same as it is now.

MR. JENSEN: An important consideration relates to the formation of these regional subcommittees. Actually the success of the whole proposal might depend on how effectively they could transmit their ideas to the national group.

MR. UDELL: We have had, in the past, so many committees associated with the Service or with the various organizations that I would like to know what value the committee would be without some authority. The APHA Shellfish Laboratory Committee has turned out a lot of work. Some of the most important development work came out of the original APHA shellfish committee which had a semi-official status. Just recently we have established a shellfish sanitation committee in the National Shellfisheries Association.

I think there is no question of the need for a group where the problems could be presented and studied, but I still have a feeling unless it has some semi-official status it won't do us much good. For instance, the little flare-up in the New York-New Jersey metropolitan area was actually due to a misunderstanding and misinterpretation of local standards for market shellfish by an overzealous inspector. But the main difficulty hasn't been brought up. It wasn't actually the standards, it was a misinterpretation of standards. The real difficulty was due to the use of a dry-refrigeration pack. This is something that could very well be studied by the group. I have already asked the Oyster Institute of North America to study it.

This is, in effect, the problem. The largest buyer of oysters in New York has decided to pack and ship their oysters under dry refrigeration. This company may purchase oysters from Company A this week. They will buy from Company B next week. If these companies are to pack in dry refrigeration it necessitates a fair sized refrigerated storage room. The oysters are packed in a pint container and then packed in cardboard boxes. These containers are not placed in cold storage while awaiting transportation. This caused the difficulty. Because of this arrangement oysters are not always properly refrigerated. Companies A and B may not want to build large dry refrigeration rooms because they have no idea how long they will have a contract with the New York buyer.

It is a problem which affects the oyster producer, the shipper, and the receiver. Here is a problem which affects everyone down the line on quality control. It is a problem which has affected Maryland, Virginia, and New York. I feel the answer is that it should be studied by a group which would have some official capacity. If a committee such as Mr. Brown's approached the purchasing company, they would say, "that is fine" and take it under advisement. The same thing would happen if I were to take a recommendation of the committee to my Commissioner. His first question would be, "What is the official standing of your committee?" If I go to the Commissioner and say that this is a committee that has official connection with the PHS or FDA, he will know it is important and probably be guided by their recommendations. If they have no official standing, their recommendations will be of very little value.

MR. FAULKNER: Any other discussion on this point? There is no motion. Wouldn't it be the better part of judgment to think about it and come back to it, when we are summarizing tomorrow?

The idea that Dave Wallace brought up of expediting the drafting of a manual isn't quite clear to me. It seems to me that if such a committee were appointed and drafted a manual they would still have to send it out to all participating States, the industry, and perhaps a representative number of municipalities throughout the country to obtain comments. If such a committee was given too much authority, many of the States might feel that they hadn't been given adequate voice in the discussion.

MR. BROWN: There is always that in a collection of various interests. Certainly no committee would forestall the opportunity of any State or local agency in expressing opinions when exploration of such proposals was going on. Once the comments were obtained the evaluation would be worked out by the committee. Issues have to be reconciled sooner or later.

MR. FAULKNER: Would you like an expression of opinion now, Bob, since it is your proposal?

MR. BROWN: I haven't any proprietary ownership with regard to this proposal. It is laid on the table. It is up to the conference as to what to do about it.

MR. FAULKNER: Does anyone wish to move the consideration of this at the present time? If not, we will defer action to this until tomorrow.

The next item on our agenda is the discussion of changes in Part II of the revised shellfish sanitation manual. I think that almost all of you know Mr. Eugene Jensen, Chief of our Shellfish Sanitation Section. Mr. Jensen.

Mr. Jensen spoke from a prepared paper which listed all proposed changes in the shellfish sanitation manual. The discussion occupied the remainder of the morning and a substantial portion of the Monday afternoon meeting. The prepared paper and item by item discussions are attached as Appendix I. The discussions terminated in the unanimous adoption of a resolution adopting the manual, as revised, as the guide for subsequent operations of the program for the certification of interstate shellfish shippers. (Pages 41 and 121) E.T.J.

Monday afternoon - August 27, 1956

CHAIRMAN: Mr. Robert M. Brown

MR. BROWN: The first paper on our agenda this afternoon will be presented by Mr. Ronald Macomber, Sanitary Engineer from the Public Health Service Regional Office in New York City. He is responsible for shellfish sanitation activities in that Region. Mr. Macomber.

Mr. Macomber spoke from a prepared paper entitled Treated Sewage Discharges into Shellfish Growing Waters, and which discussed the problems resulting from discharges of sewage treatment plant effluent in the vicinity of shellfish growing areas. The difficulty is caused by occasional lapses in treatment which may occur. His complete paper is included as Appendix B, page 53. E.T.J.

MR. TAYLOR: We had a good example of this problem in Massachusetts. We have an open area where people dig clams every day in the week. Then one day a large sewer broke and sewage leaked out over the clam beds. Of course, we closed the area immediately, although there was some question of our legal right to do so under the existing laws. At the next session of the Legislature we introduced a bill requesting emergency powers for the Department to close an area in case of an emergency. Unfortunately, the purpose of the bill was not understood and it didn't pass. The bill was reintroduced the next year, and it has now become the law of the Commonwealth. That doesn't answer all the problems as Mr. Macomber pointed out. Any ideas I can get on that subject will be appreciated.

MR. MEREDITH: We have an area in Hampton Roads (Virginia) that has been opened and closed several times. We think we have it under reasonable control at the present time. It involves a system of reporting sewage overflows or breakdowns of pumping stations. We have a dual automatic recorder on one pumping station. Sewage may flow over a weir and out through an emergency outfall or sometimes when the tide is high, there is an inflow of seawater into the system. The recorder can tell us what is happening. We also have automatic alarms on some of the other pumping stations that are near the area. The sewage treatment authority also keeps detailed records of both the coliform and bacteria data on the effluent. The system is so set up that we are notified immediately if there is any increase, or of any overflows. The area was first opened in 1950 and has been temporarily closed several times since then due to breakdowns and overflows during storms.

MR. BROWN: Has it been satisfactory?

MR. MEREDITH: It has been satisfactory. It is all leased oyster grounds so we don't have many people to notify, but it does require a great deal of administrative work.

MR. HOBBS: Do you have any difficulty in some of the older areas where you have combined sewers?

MR. MEREDITH: The pumping station where we have a double recorder is on a combined sewer. We don't have many others.

MR. SHEA (Rhode Island): We have every variety of this problem in Rhode Island. We have old sewer systems, built on the combined plan, carrying storm water as well as sewage, and modern sewer systems carrying only sanitary sewage.

Sanitary Engineers have in the past provided inadequate means for the chlorination of sewage at many sewage treatment plants. In the case of the chlorination of drinking water they have provided all kinds of equipment, but in sewage chlorination in the smaller plants generally only one chlorinator, battery of tanks and scale have been installed. The result has been that at plants where an operator is present only during the daylight hours leaving, say at four in the afternoon, very often the tanks supplying the chlorinator empty shortly after his departure and no chlorine is added to the sewage until his return on the next day. Adequate chlorination of sewage discharged near shellfish growing areas is often lacking because of high flows from combined sewers during storms and because of the presence of industrial waste in the sewage. Such a variety of circumstances are met that in the final analysis, where it is affected by faulty sewage treatment, the determination of the suitability of an area for the taking of shellfish must rest on the judgment of the public health authority concerned, after he has taken into consideration all of the possibilities for the failure of sewage treatment.

I might add that in the case of one shellfish area in Rhode Island, its suitability for use depends upon the proper operation of a sewage treatment plant in another State, the Commonweath of Massachusetts.

MR. TAYLOR: Are there any States that can take immediate and summary action against the violators of pollution control laws?

MR. BROWN: Speaking for Maryland, our State laws are written much as yours are and punitive action against the community could be taken only if they persisted in willful violation. We have talked with our legal advisors to see if we could get a law which would make discharge into non-polluted waters a misdemeanor. I would like to see if we could develop some information around this point.

From time to time those of us who regulate the restricted areas are asked by representatives of the industry, particularly the group who harvest shellfish, "Why don't you require the installation of sewage treatment plants so that the areas can be opened?" Can we be given some information about extent of injury being done to the producers of shellfish by the closing of shellfish areas because of pollution?

MR. WALLACE: I think that the pressure on the oyster industry today is great--probably greater than it has ever been. The reason is that we have a gradual attrition of oyster grounds. We have a gradual growth of residence and cities and towns along the tidewaters of all our coastal areas; and the shellfish industry seems to be the loser all the time. There are now approximately 20,000 acres of oyster grounds in Maryland closed because of sewage pollution. The potential of a good production area is 100 bushels per acre per year.

In Virginia, the acreage is not so big particularly with the Hampton Roads areas being cleared up, but it still amounts to a considerable amount of oyster ground. Every coastal State from Massachusetts to Texas has some closed areas.

This is particularly important today because our production is down. We have had a lot of adverse conditions in the oyster industry which has made us decline and all of us in the industry are seeking to augment our production because our demand is at an all-time high. So that there is a pressure from the industry. However, the industry has become philosophical about it. They feel there is little hope that the grounds will ever be opened again.

MR. JENSEN: There is Humboldt Bay, California.

MR. WALLACE: Humboldt Bay is an area of oyster ground of 5,000 acres. It was a polluted area. A treatment plant was installed. Two surveys were made prior to the opening of the area. Since that time oysters have been planted there and it looks as though production of 1/2 million bushels can be expected from that ground in the next two years which is a substantial step in the other direction. That is an exception rather than the rule. Many of our industry members are on the verge of losing more and more ground because sewage treatment facilities are inadequate because of the growth of the cities.

MR. UDELL: We have 5 million ducks raised on Long Island every year. Quite large quantities of waste have been going into the Bay resulting in the closing of hundreds of acres of shellfish land. The shellfish people have taken action and the State Water Pollution Control Board has directed the growers to remove these wastes from the water. This year we hope to have 41 treatment facilities in operation. It is anticipated that we will be able to rehabilitate 3/4 of the areas following contruction of these plants. If the shellfish people get hurt bad enough the chances are they will organize and spearhead some sort of objection and get help from the State agencies.

MR. WALLACE: I think it is absolutely the wrong attitude. It should not be necessary for an industry to be damaged before the State takes action. Why must the industry be hurt before they can get action from the State health authorities? However, our industry has quite frequently run into that feeling in the State. We have pushed for opening of areas so that shellfish areas could be put back into production. They have often felt that we were working against the health authorities that had the administrative control. As a consequence we have encountered considerable resistance from the health authorities to action which we felt to be well justified. We are the injured parties because the shellfish industry was there first and the pollution has come along later.

MR. BROWN: I might add a point here. I am sure that we all appreciate the operational problems pointed up for us by Mr. Macomber in his discussion. These operations are costly and require a great deal of personnel time. Cambridge on the Choptank River is an example of a situation we have in Maryland. Prior to the substantial growth of this community there was no sewerage system. It was necessary to have a small restriction on the Choptank River because of the discharge of raw sewage. Then as a result of a campaign to eliminate the restriction, sewers and a sewage treatment plant were constructed. Everyone was appalled to find the restricted areas had to be enlarged because of the nature of the outfall discharge. The State Health Department is now attempting to have the necessary improvements made in the system to diminish the size of the restricted area, but this has not yet been accomplished. It will be a very costly operation for the city of Cambridge because it means the elimination of some combined sewers.

MR. JENSEN: This is basically a design problem. These features could be built in relatively easily when the plant is first constructed.

The total cost of the few safety features, percentage-wise, is not large in terms of the initial bond issue. But they are a lot of money as an improvement to something that has just been constructed.

MR. FAULKNER: Mr. Gilbertson spoke this morning on the new Water Pollution Control Act and the construction grants program. This is something that people who are interested in the shellfish industry and in opening up more areas might keep in mind.

MR. BROWN: A good deal will depend on how the value of shellfish is assessed. A sewage treatment works can often be installed providing for preliminary treatment or chlorination so the effluent would not cause any trouble in the receiving water. It is extremely difficult to convince a community that they have to go to considerable additional expense in building a secondary treatment plant to protect shellfish in the vicinity of the outfall. They have to pay the entire tariff for the benefit of the folks who derive their livelihood from the shellfish business. In this I am merely repeating the contention of the city fathers under such circumstances.

MR. WALLACE: Did Mr. Gilbertson say that shellfish growing areas would be one of the public health criteria for construction grants?

MR. FAULKNER: That has been proposed. I would like to ask a question about the effectiveness of sewage treatment. Mr. Macomber stated in his paper that a 90-95% reduction of coliform was possible. How does this stand up with actual experience?

MR. MEREDITH: In the Hampton Roads area which I mentioned a few minutes ago, the treatment is primary with chlorination. I would estimate that the coliform reduction at close to 99%. I must admit, however, that the chlorine cost is terrific.

MR. TAYLOR: I believe that the Metropolitan District Commission of Boston is currently spending about $500 a day for chlorine for treatment of primary effluent from a plant for 500,000 people. They estimate chlorine cost of about one-half million dollars per year for the new station which will treat sewage from the remainder of the Boston metropolitan district. They are even considering manufacturing chlorine at the plant.

MR. BROWN: This financial data is extremely enlightening. Do you have any information as to the gross value of shellfish obtained from these areas?

MR. MACOMBER: I believe that we once estimated the value of clams from the Boston Harbor for a year at around $1,000,000.[*]

MR. SHEA: Chlorinating sewage containing industrial waste is not simple. We have some plants where the chlorine demand is such that they can't get residual chlorine in the sewage. We have used all sorts of approaches to the problem. One is to get industry to put their wastes into sewerage systems over a period of 24 hours. We have tremendous fluctuations in the chlorine demand of sewage. Chlorine demand in the City of Providence is sometimes five p.p.m. and sometimes 40 parts. There are very serious technical problems to efficient chlorination.

MR. TAYLOR: The chlorine demand in some areas having tannery wastes may vary from 15 parts per million to 300 parts per million. Chlorination doesn't appear very practical in some respects.

MR. BROWN: This is an issue on which, by no stretch of the imagination, could we arrive at definite decisions this afternoon. It is an area which needs considerable study in order that a basic policy for the future might be determined. I hope that if any of us accumulate further information with regard to this problem that we will find ways of sharing such data with each other.

MR. BROWN: Our next scheduled paper is to be presented by Mr. Harold Udell of the New York Department of Conservation.

Mr. Udell spoke from a prepared paper. His complete paper is included as Appendix C, page 80. He pointed out that there were an estimated 15,000 pleasure craft equipped with flush type toilets in the marine district of New York State. The pollution resulting from such pleasure boats has been investigated by the New York State Conservation Department in conjunction with New York University and the Interstate Sanitation Commission.

MR. BROWN: This is certainly not a simple problem. Trying to enlist the cooperation of people in controlling the use of recreational waters is a real problem.

MR. SHEA: The Wilcox-Crittenden Company of Middleton, Connecticut, is now producing a device for treating sewage from cabin cruisers. The device has been investigated by the New England Water Pollution Control Commission, and it has been found highly effective. You can get literature from Wilcox-Crittenden. The cost is about 50 to 75 dollars. It can only solve a portion of the problem but it might be considered a good start.

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[*] Mr. Macomber subsequently advised that the correct value should be $570,000.

MR. TAYLOR: The unit is quite small and will fit on a small cruiser. It is located right next to the head and is operated by a small hand pump. It has a holding time of about 20 or 30 minutes and uses a chlorine solution such as chlorox. You simply insert the bottle of chlorine in the holder. Tests have shown that the effluent from one of these units is almost free of coliform organisms. It is now in production and has been exhibited at the National Motor Boat show.

MR. BROWN: Our local shoreline residents complain that we require them to keep wastes out of the shellfish waters, but do nothing about the discharges from pleasure and work boats. We don't have a good reply except to say that we are attempting to enlist the cooperation of the pleasure boaters to avoid the discharge of wastes over the oyster bars. Actually, it is difficult for a pleasure boat operator to determine if he is operating his craft in the vicinity of oyster beds.

MR. TAYLOR: The State of New Hampshire has been very concerned about Lake Winnipesaukee. The lake is used as a source of water supply but was being polluted by wastes from cabin cruisers. The problem is also of concern to the Navy. I have been thinking about the possibility of a cavitator. Cavitator is a trade name for a superaeration process. Space requirements are such that it should be practical. We have one in use in Massachusetts which we have been watching with considerable interest. It might be entirely practical.

LT. COMDR. GOODEN: The Navy has been watching the development of such sewage treatment devices with interest. The real problem we have is on combatant type ships where weight and space are at a premium. The Bureau of Ships requires compensatory reduction when any new equipment is put aboard.

We have been studying this problem in San Diego Bay in the last 4 or 5 years and in other harbors where we have a restricted area. It is a real problem where there are a lot of ships anchored in an area.

MR. BROWN: Any further discussion on this? Any thoughts on how we might distinguish between pleasure and work craft?

DR. BYNOE: We can write regulations for the work craft but we can't write regulations for the pleasure craft.

MR. BROWN: How about the larger commercial craft? We have quite a number of these in the Chesapeake Bay going between the various communities with harbor facilities.

DR. BYNOE: I don't think that our shellfish committee, as such, can do much about this except call it to the attention of the States.

MR. TAYLOR: It might be well for some organization to go on record as seeking a study to be made of this thing. Perhaps we might recommend that the Public Health Service investigate methods of sewage disposal on larger ships.

MR. BROWN: This might be a research project which could be undertaken under the new law.

MR. UDELL: I am happy to see that there is so much interest in this. We have talked about this with the Interstate Sanitation Commission. We are really interested in doing something with the small craft if there is actually a problem. Eventually we will try to initiate a project to develop some sort of equipment which can be used for sewage treatment. We are making application for a grant from the National Institutes of Health to study the problem of pollution from small craft and to find out if it presents an actual hazard or not. We also want to study the effect of individual sewage disposal facilities on quality of marine water--that is in areas which are now marshalnds but are being filled in for individual home construction.

MR. BROWN: Thank you, Harold, for your contribution to this discussion.

Tuesday morning - August 28, 1956

CHAIRMAN: Mr. David Wallace

MR. WALLACE: It is a real pleasure and honor for me to preside over this session on bacteriological standards for shellfish. I am not qualified as an expert in this particular field; and therefore I am afraid I can only listen to the discussion as one representing the industry and who thus has a vital stake in this matter. We are fortunate, however, to have a panel of experts who are going to discuss various aspects of this problem and to present data which should clarify the matter for all of us. Since this morning's session is devoted exclusively to the presentation of material, I would like to suggest that you write down questions which come to mind during the various discussions so that you would be prepared to participate in the afternoon discussion.

Those of us in the industry are particularly grateful to have an opportunity to participate in this workshop. It makes us feel a partner in the triumvirate. We are participating in this discussion hoping that we may improve our operations as a result of the deliberations here.

I am now going to present our first speaker, Mr. C. B. Kelly, Jr., Chief, Shellfish Sanitation Laboratory, SEC, Pensacola, Florida. Mr. Kelly.

MR. KELLY: Gentlemen: We have a lot of ground to cover and if I may be permitted I will read from the material being given to you. The material represents a number of years of work and it is therefore difficult to bring it down to a few pages. I have taken the parts which I consider pertinent to the shellfish bacteriological studies.

Mr. Kelly spoke from a prepared paper. His complete paper is included as Appendix D, page 85. Mr. Kelly discussed the shellfish bacteriology research which has been carried on by the Public Health Service's Shellfish Sanitation Laboratory since 1948. E.T.J.

MR. WALLACE: Our next speaker will be Dr. Eugene K. Harris, who is the statistical analyst for Milk and Food Research, Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio. Dr. Harris.

Dr. Harris spoke from a prepared paper. His complete paper is included as Appendix E, page 95. Dr. Harris discussed some of the statistical problems involved in relating the bacterial content of shellfish to the bacterial content of water. He emphasized that oysters from the warmer southern waters appeared to have higher coliform counts than oysters from northern waters. E.T.J.

MR. WALLACE: Our program lists Mr. Ludewig of the New York City Health Department as our next speaker. He could not attend the meeting, and his prepared paper will, therefore, be presented for him by Mr. Albert Fortgang, also of the Bureau of Food and Drugs, New York City Health Department.

MR. FORTGANG: Before proceeding I would like to correct a statement made by one of the earlier speakers. He said, "Truckloads of shellfish might be condemned by the New York authorities". This is not correct. We do not condemn shellfish. Our action consists of shutting out the shipper from further shipments into the city. Shipments are not seized or destroyed unless they are decomposed or contaminated.

We do not necessarily believe that the New York City program is perfect. It is not rigid. We are amenable to change. If uniform market standards can be agreed on we will give them every consideration. The objective of the standard, as we see it, is to get high quality shellfish for our consumers and to protect them against disease.

Mr. Fortgang spoke from a prepared paper. His complete paper is included as Appendix F, page 101. Mr. Fortgang discussed the use of bacteriological examinations as a means for controlling the sanitary quality of shellfish sold in New York City. E.T.J.

MR. WALLACE: Our next speaker is Mr. C. S. Brinsfield of the Maryland Department of Health. He will tell us about some of their research on shellfish bacteriology. Mr. Brinsfield.

Mr. Brinsfield spoke from a prepared paper. His complete paper is included as Appendix G, page 106. Mr. Brinsfield summarized the results of bacteriological investigations of shellfish and shellfish growing waters made by the Maryland State Department of Health. He suggested that standards might be based on E. coli instead of coliforms and urged that a research project on the distribution and significance of E. coli in shellfish be instituted. E.T.J.

MR. WALLACE: Next, we will have the paper on the Canadian bacteriological standards for oysters by Dr. E. T. Bynoe, Chief, Bacteriological Laboratories, Laboratory of Hygiene, Department of National Health and Welfare.

DR. BYNOE: Thank you, Mr. Wallace. Before I proceed, I would like to correct my title as it appears on the agenda. I am in no way associated with the Food and Drugs Division! My correct title is Chief, Bacteriological Laboratories, Laboratory of Hygiene, Department of National Health and Welfare.

Dr. Bynoe spoke from a prepared paper. His complete paper is included as Appendix H, page 114. Dr. Bynoe described Canada's experience with a bacteriological standard for shucked market oysters, and stated that their experience indicates that such standards are desirable. He suggested the possibility of using E. coli as an indicator organism be considered. E.T.J.

DR. SHANHOLTZ: We had a conference last night and came to the conclusion that we had some figures which closely paralleled those of Mr. Kelly's. In introducing this I would like to speak as a health officer and not as a bacteriologist.

Virginia is one of the major producers of shellfish. We in the State Department of Health have responsibility in the sanitary production of shellfish. The important thing to keep in mind is that to produce a satisfactory shellfish one has to keep pollution off the growing beds. We work hard at this. We have growing beds free of pollution. Another thing is good sanitation in the plants--satisfactory equipment, satisfactory operations, and proper refrigeration.

It is a very frustrating experience for me as a health officer to find, that our producers, even with this equipment and supervision, still don't meet so-called standards. Incidentally, I don't like to speak of these as standards--we are looking for a standard at this time. When we are satisfied that we are producing a satisfactory oyster from the standpoint of wholesomeness and safety, we should then adjust our standards. In our opinion "standards" should reflect the actual numbers of bacteria in shellfish which have been harvested and processed under satisfactory conditions, rather than be a simple figure which was determined arbitrarily. Accordingly, I should now like to introduce Mr. Gregory to give you some fact and figures on an experiment of ours.

MR. GREGORY: In recent years a great deal has been accomplished in the construction of oyster plants and equipment. Also, much has been accomplished along educational lines in improving operations. Because of these advancements, it was felt that the shucking room is not the source of contamination which it was once thought to be. We, therefore, decided to investigate the situation from the bacteriological standpoint.

Preliminary work at White Stone was done to determine what steps in oyster handling should be investigated to obtain data on the increase of coliform bacteria in shucked oysters over that of oysters in the shell. The Public Health Service gave us the benefit of their knowledge, and four sampling stations were established in each plant for the tracing of a single lot of oysters, as follows:

1. Shell Oysters. A composite sample from shellfish on shucking benches or in storage bins.

2. Shell Oyster Washings. Washings of mud and detritus from the outside surfaces of a composite sample of shell oysters.

3. Oysters as Shucked. Our bacteriologist would have a shucker put one oyster directly into a sterile mason jar, then he would move on to another shucker and get an oyster from him and so on until he had enough for a composite sample.

4. Oysters as Packed. Samples of oysters as packed in the plant for market.

The project was started in June 1955, and continued through April of this year. We examined 121 lots of oysters at the laboratories in White Stone and Norfolk.

The oysters which were used in this study came from the lower part of Chesapeake Bay, Mobjack Bay, and the mouths of the York and Rappahanock Rivers. All of these areas are remote from any on-shore pollution.

The data obtained was submitted to Dr. Harris of the Public Health Service, who very graciously made a statistical analysis to see what conclusions could be derived.

One method of analysis used as a base line for comparison was the sum of the coliform MPNs of the shell oysters plus the MPNs of the shell washings. By this treatment, it was shown that there is a substantial increase in counts during shucking. It was also shown that the overall bacterial change from just prior to shucking to "as packed" is not significant.

Probability curves and graphs were developed for each of the 4 sampling stations. These show the percentages of samples that fall in each MPN coliform classification. Following this probability curve on our shell oysters, we find that during the winter months about two-thirds of the samples have a coliform MPN of 230 or less. 90% had coliform MPNs of 2,400 or less. However, during the summer months practically none of the samples were less than 230 and only 25% were 2,400 or less.

The "as packed" is the product as it goes on to our markets. In the winter months 10% of our samples had an MPN of 230 or less; 50% fell to 2,400 or less; 75% fell within the group of 9,000 or less; and, 90% fell below 24,000.

That is the factual information.

DR. SLOCUM : Since the inception of the shellfish program in 1925 the FDA has not taken an active part in shellfish sanitation. Possibly because I am a bacteriologist and a neutral one, I have been selected for the job of summing up the several papers. Actually they speak well for themselves and need very little summarizing from me.

I feel that a remark by Mr. Kelly several years ago is very appropriate. He commented upon the fact that if one reviewed some of the earlier work, it was amazing to find how little progress had been made in recent years. I think the reports this morning bring out one very important and gratifying thing. I think the research programs by the Public Health Service and others have been of very great value and are pinpointing many of these problems which have long needed serious research. I hope I reflect the attitude of the entire group that this should continue and be expanded to several areas where additional research is required.

The question of bacterial standards for oysters has come up nearly every year before the American Public Health Association shellfish committees. We still do not have a satisfactory answer. Apparently we are not now ready to adopt a satisfactory standard for the shellfish as they are grown and harvested. For many years, we have had this controversy about the difference between the shellfish raised in the northern waters, where the water temperatures are cooler, and those raised in the southern States. We now have concrete evidence that there is a difference--Mr. Kelly's paper, Virginia's work, and Mr. Brinsfield's report. These findings clearly indicate the need for further research. I think particularly important is the work in southern waters showing that the present standards relating pollution of the growing waters to shellfish contamination are not compatible in the warmer growing areas. It clearly points out that need for further research in this area.

The bacterial content of shellfish as they reach the consuming market is the summation of all sources of contamination; the contamination of the shellfish as harvested, the increase which we have heard about in the shell stock, the contamination from mud and debris and by the washing process. Also the point that there is growth of coliform organisms during shipment seems to be clearly borne out by the evidence we have heard here this morning.

The development of a realistic market standard must be empirical. I have great sympathy for the use of standards at the consumer level as a pressure to improve sanitation. Such standards have demonstrated their value as indicated in the papers of Dr. Bynoe and Mr. Fortgang. It is a factor of great significance and should be made a part of the overall program.

I think an important question is whether there is a common denominator for measuring pollution in both the cold northern and warm southern oyster producing areas. I am impressed by the statements of several speakers that E. coli may well be that common denominator. We have in recent years, had several procedures developed which may lend themselves to accurate E. coli determinations. In addition to the Eijkman test, we have the English McConkey system confirming at 43° or 44°.

Recently Levine has described a boric acid-lactose medium that will give you E. coli confirmation concurrently with the coliform determination. There are difficulties in applying these methods. The requirements of these tests are strict and good laboratory procedures are essential to good results. This, I think, is an area in which immediate research effort is required. Although it may not be the answer to the assessment of pollution in the growing areas, it would be a valuable supplementary test which could provide valuable information on the sanitary quality of shellfish.

MR. WALLACE: Thank you, Dr. Slocum. We have with us a group from American Cyanamid Company. I will introduce our speaker, Dr. Upham, Director, Products Development, Fine Chemicals Division, American Cyanamid. Dr. Upham will discuss the bacteriological effect of chlorotetracyclene in the processing and storage of fresh shucked oysters. Dr. Upham.

Dr. Upham spoke from a prepared paper, copies of which may be obtained from American Cyanamid Co., Food Industry Department, Princeton, New Jersey.

MR. BROWN: Are copies of your paper available?

DR. UPHAM: It will be published. We will be happy to send reprints to anyone here.

MR. BRINSFIELD: Do you know anything of its effect on pink yeast? Could it be used as a rinse on boats?

DR. UPHAM: It has no effect on pink yeast. We did find, however, that hexachlorophene is very potent in laboratory trials. This is the active ingredient in Dial soap - G-11.

DR. BYNOE: Would the Food and Drug Administration have something to say about the use of aureomycin?

DR. UPHAM: The Food and Drug Administration has not yet approved the use of chlorotetracyclene in shucked oysters although its use is permitted in poultry. We are now working on a field test for residuals.

MR. WALLACE: Thank you, Dr. Upham. If there are no further questions, we shall adjourn for lunch.

Tuesday Afternoon - August 28, 1956

CHAIRMAN: Mr. David Wallace

MR. WALLACE: I suspect there are many questions you may wish to direct to one or another of the speakers. If it is a specific question, indicate the person to whom you may direct the question so that we can proceed in the discussion of the problem in an orderly way.

MR. BROWN: I would like to comment on my concept of the application of a market standard. I hope you will understand that what I say is put in a non-partisan way. I am not speaking about this problem from the viewpoint of Maryland. I am extremely jealous of this shellfish control program. It is uniquely successful. As one who admires this kind of procedure, I don't want it infringed upon from any direction.

It would appear from the application of market standards in various ways that the program was being infringed upon. It is my understanding that the certification of the producer of market shellfish means that the shellfish has been obtained from approved growing areas, and that they have been shucked, processed, and packed in a plant which has measured up to satisfactory standards. Such products are identified by a certificate number embossed on the container.

In the application of the program by the State, and policing by the Public Health Service, the certification means that the responsibilities of the program have been measured up to by the State, and by that plant in producing that particular product. Now if that product winds up in some market in an unsatisfactory condition, it is a reflection upon the processes which have been followed in getting that product to market. In my judgment, it is not a reflection upon the individual plant, or on the individual State, because they have met all the safeguards of the shellfish program.

Mr. Fortgang mentioned this morning in his presentation that in New York City, "provision was made for exclusion of a shipper of shellfish from New York City ... high coliform samples are followed up with warning letters to the shippers ...".

Again I don't cite this as a challenge from our colleagues in New York City, but merely as an example of the way the controls are "upped". Dr. Bynoe mentioned much the same thing in his presentation.

This is an area in which I think we should give a good deal of thought. In my judgment, a market standard should be agreed upon by this conference to satisfy those market areas which are desirous of having one. On the other hand, it should be understood that the use of a market standard should not result in an abrogation of the certification of a given producer if this market standard is not met for one reason or another. I hope that I have made clear to you the distinction I am drawing between the results of the market standard, and the controls provided by the certification program. I think that it is quite important from the standpoint of the integrity of our program.

We agree by common consent as to how the program is to be operated and that is the way we want it to be. But if, in the subsequent administration of our individual responsibilities, we negate the certification of a producer, or a producing State, we find ourselves in a contradictory position.

MR. WALLACE: There have been a number of possible approaches to this idea to a market standard. You will remember Dr. Bynoe's three categories: Acceptable, Acceptable on Condition, and Rejectable. This is the time to make your feelings known.

DR. HYNOE: Mr. Brown has commented on the possibilities that in setting up a market standard we may be defeating the purpose of the certification program as outlined in our manual. The market standard, we feel, is very important. At the same time, I do not think it in any way negates the value of the manual. When we test a sample we assume that it has been produced in an approved area and has been handled satisfactorily. But we also know that the quality of plant operation varies from day to day. It is only by testing the final product that we are able to spot those instances when things go wrong.

In Canada we license any manufacturer who is to sell a biological product. We give the plant a thorough inspection. When we are convinced this manufacturer is meeting all our requirements, he is granted a license to sell. However, we still examine his product. On occasion we find things have gone wrong. Many things can upset the balance, so to speak, and a poor lot may come out of an otherwise well functioning plant. That is the only test we have of a product when it reaches the consumer.

We can't rely entirely upon the certification program. We know from the bad oysters we have had that things are not always going as well as they should. Conditions have been rectified, but without the final check it would have been missed. It is just an additional check for the safety of the consumer. Several men have impressed on us the importance of good producing areas and good clean plant operation. I don't think that anything we have said should be taken in any way to detract from what we have already tried to do. I think that a market standard adds rather than detracts from the certification.

MR. BROWN: I agree with everything you say. I would have the conference know that I have no objection to a market standard for shellfish. However, if the conference adopts a market standard, it should outline how it is to be applied.

MR. UDELL: It would be very fine if we could have a market standard, but I don't think that anyone here is in a position to decide what constitutes a market standard.

I was pleased to hear the discussion of E. coli as a possible standard. Every time we discuss the merits of the coliforms some bacteriologist tells how certain non-fecal coliform organisms are, at times, fecal and thus proves that coliforms are just as good an index as fecal E. coli. I don't think coliforms are a feasible type of standards for a food product.

New York does some work on this. We have some areas which border on Moderately Polluted. For many years there has been an interest in whether clams taken from these areas could be used. In a particular area we have found no correlation between the 70 MPN for water and 230 MPN for clams. Every two weeks for a 14 month period we have made examinations from many stations in this area. We have found that there are about as many samples of clams that will show E. coli when the waters are less than 70 MPN as when they are greater. It does not make a bit of difference whether or not these waters meet the PHS recommendation of

70 MPN for growing waters. If you go by a true fecal coli in the clams, only 50% would meet standards. If we are to use a coliform standard who is to say the limits should be 50 coliform or 24,000 coliforms.

I would think this is the time for someone to write a resolution to see if we can get the Public Health Service to undertake such a study. It seems to me it is the only agency in the country capable of handling a project as complex as this one is.

MR. WALLACE: Mr. Brinsfield has suggested that a committee be set up to consider a market standard.

DR. BYNOE: I like to think of oysters as being similar to milk. Milk produced under clean conditions has a certain bacterial content. If the bacterial content is higher than that it indicates the milk is produced in an unclean way and may be dangerous. Should we not be looking at oysters in the same way? Oysters grown in a clean area where there is no evidence of sewage pollution would have a certain bacterial content, although oysters growing in different temperature waters may be somewhat different.

Why can we not be practical and adopt standards related to oysters that are produced and processed under clean conditions? If oysters have more bacteria than those normally produced under clean conditions, we know something amiss has happened. A standard based on the number of bacteria which are dangerous is an ideal, but it is not possible to obtain it.

MR. KELLY: I think that Dr. Bynoe is attempting to lead us in a direction that is sound. As I understand it, he would have us consider the formulation of standards based on obtainability. This, I think, is a practical approach. This was the sort of thinking that was applied to the development of standards in Ottawa, in 1950. We spent a considerable amount of time and we agreed, at that time, that a standard should not be a fence beyond which nothing could pass because we had no idea of what consists of the bad zone. At that time we were in a greater quandary than we are now. For that reason the middle zone of acceptability was properly left wide to encourage investigations, and with the hope that in a few years we might be able to narrow it down. Dr. Bynoe's experience in the Canadian market, and ours here in this country, will eventually allow us to do that. I would certainly hold for following the philosophy expressed in Ottawa that we should not establish a hard and fast line of demarcation. It is a principle in the Public Health Service water standards that there is some latitude.

MR. HOBBS: Mr. Kelly, what standards should be established? Are coliforms satisfactory?

MR. KELLY: We must discuss what indicator organism we can use and what procedures we shall apply.

MR. UDELL: Mr. Kelly, in your paper you indicated that 60% of the oysters taken from waters free from sewage had a coliform density greater than 230. These 230 were not sewage type organisms. However, as the oyster goes through processing, they may end up with 24,000 organisms. These oysters are packed and sent to market and the people in the market want to know whether they are fit for human consumption. We have only one way to make this determination--take a sample to a laboratory for bacterial analysis. They may have 24,000 coliforms or 240,000 coliforms and it is up to someone in that inspection agency to determine whether or not these oysters have been contaminated. The whole point is this--either everyone shall agree that there shall be no bacterial examination in the receiving market, or, if we are going to use bacteriology as a tool, we have to decide what the test organisms mean. We must know how much a person may consume before we have any illness. We should decide on a certain limit.

MR. KELLY: I would like to correct Mr. Udell's statement. I did not say that the area was sterile or that it was even entirely free of sewage or of coliforms. It is an approved growing area which is a part of a larger bay that does receive sewage. It cannot be said that the organisms are not of a sewage type.

DR. SHANHOLTZ: We use coliform counts as an index of sanitary cleanliness; not as an index of the risk of actual disease. High counts would indicate poor sanitation.

DR. BYNOE: Certain coliforms are able to cause disease, but I concede that Dr. Shanholtz's contention is generally true.

DR. SHANHOLTZ: We are not trying to determine the risk you are taking with disease. Only an index of cleanliness and sanitation.

MR. PRINGLE: This is similar to milk sanitation. A high count may be a good indicator of poor sanitation measures.

MR. FAULKNER: All of this tends to hit at the same point of placing bacterial examination in proper perspective. Bacteriological examination is an index of the effectiveness of our control efforts. We are measuring, as a final step, what is practical to assure a good product. But I would like to support several of you people in urging a reasonable and sound approach to establishment of a standard.

It seems to me that if we can think in proper perspective, we are in a position to establish some sort of bacterial standards based on practicability of attainment. When you get the high counts--you can look for something wrong. Milk standards have been based on attainability. They measure the effectiveness of both control and processing procedures.

DR. SHANHOLTZ: It is true that high counts indicate that there is something wrong. It also indicates that with sloppy methods you take more risks.

MR. BROWN: Comparisons have been made with milk and water. There is a difference here which I don't think we have considered. We do use bacterial standards in the milk and public water-supply program. The dissimilarity is that in the milk program there is a pasteurization process and in water supply we have filtration and purification processes. Our standards are for checking the effectiveness of pasteurization and purification processes. In the shellfish program this indicator organism is a natural part of the environment. Also these organisms can multiply at temperatures in which this creature is kept after shucking. Thus temperatures can markedly influence the market count.

MR. KELLY: I endorse Mr. Faulkner's idea. Bacterial examination is only a tool to indicate the need for investigation of unsatisfactory conditions. This is recognized in the shellfish manual. The purpose of the bacteriological investigation is to reinforce the sanitary surveys. It shows the median coliform content of water collected from those portions of areas known to be most probably exposed to fecal contamination. We should not use a bacterial test as the sole means of excluding a product. However, we can classify the shipments in the market as "good", "bad", or "indifferent" by means of bacterial examination. We must be careful in establishing the line of demarcation between "indifferent" or "bad".

MR. TAYLOR: There is this matter of imported frozen shellfish. We have only the report of the bacteriologist on the conditions in which they arrive. We must base our decisions on their report. Therefore, we are using a market standard. In our State, we have taken shellfish from contaminated and uncontaminated areas and quick frozen them. We get a very marked decrease in both coliform and plate counts. If we are talking about the conditions of marketing shellfish that have been frozen, how can a bacterial examination give us much to go on?

In New England we have been trying to investigate the shipment of mussels from non-contaminated areas into New York. We have examined them at their source and after shipping them to New York, that is, we test them at point of origin and point of reception. Some results have been amazing.

I am sure that Massachusetts will be willing to cooperate with the other States and Canada in a study to see what happens to shipments under commercial conditions.

MR. KELLY: I should mention that such a study was done with quite a number of samples of shucked oysters. The study I mentioned this morning involved the shipment of shucked oysters to the Montreal market. The step up in counts in shipment was approximately one log cycle.

MR. WALLACE: It seems to me we now have some points of general agreement: 1. It seems to be the general feeling that it is desirable to have a bacterial market examination, as an index of cleanliness, in conjunction with the program. 2. The present figures on shucked oysters would appear to be unrealistically low as a result of the data presented, and discussions which have followed. 3. It would seem that there is probably a need for an interim practical market standard that we could go on for the present time--if we are going to admit that the present figures are unrealistic. 4. In the long run we are eventually going to decide just what method is going to be the acceptable procedure to be followed, and we need a committee to help us.

MR. BROWN: I would like to comment. With respect to the utilization of a market standard, I think we should shoot for an interim standard. I favor the idea, mentioned by our chairman, that a committee be appointed to work toward as definite a standard as can be developed. In this interim period, say a year, we might consider the use of the standard which has been used in Canada.

In the application of the standard, a shipper should not be cut off from the market because his shipments did not measure up to the standard. Rather, any shipment not being up to the standard should be confiscated. Requests for investigations of any violations of the standard should come down through the Public Health Service to the States for immediate careful follow-up to find out what is wrong. I'm not making a motion.

DR. BYNOE: I would think the adoption of such an interim standard would be highly desirable. It would do a lot to stimulate research. I would like to endorse Mr. Brown's suggestion.

MR. JENSEN: I agree, in principle, with Mr. Brown's proposal. However, I question if the exact values used by Canada are applicable to all areas. As Mr. Kelly has said, the lower value of 2,400 for Class I would accept only 10 or 15% of the samples of the deep South.

MR. KELLY: There are the values for "as packed" oysters from the South, area C shown on the charts this morning; 60% met a limit of 16,000; 75% met a limit of 28,000; 90% met a limit of 62,000.

MR. JENSEN: That would mean 88% of the samples would have been referred to us for some sort of follow-up.

MR. KELLY: The White Stone study showed 75% of the fall samples met 42,000 and 75% of the winter met 10,000. In the fall 9% of the samples met an MPN of 2,400; 62% - 24,000; and 88% - 24,000 to 240,000. Florida's results are slightly higher.

MR. WOODFIELD: What caused these high counts? Was it poor plant sanitation or poor refrigeration?

MR. GREGORY: The plants are clean and are, in fact, some of the best in Virginia. The "as shucked" samples had actually higher counts than the "as packed" samples. "As shucked" were not contaminated by any plant equipment. Our bacteriologist also opened samples of oysters in the laboratory. He washed his hands and opened the oysters using sterile utensils. Compared to the sample taken from the shucker in the shucking plant there was little or no difference.

DR. SLOCUM: It occurs to me that in this analysis we have overlooked one point. Coliforms are not used for judging the sanitary quality of raw milk. On the basis of wide experience they cannot be used as a measure of sanitary quality for other foods. In measuring the bacteriological quality of market shellfish we are dealing with the same sort of situation which is measured by the total count in milk products. This is well founded. If a standard is tied to a coliform determination, you will have eventually to set a lower value for E. coli indexes as a measure of pollution in growing areas. You will then have dual coliform standards, one for shell stock, and one for shucked stock on the market. This might be confusing and unfortunate. Mr. Kelly and Dr. Bynoe have very clearly shown the value of the plate count as an indicator.

DR. BYNOE: It would certainly be nice to have the two related. We should, however, encourage investigation of the other indicator organisms.

MR. KELLY: Certainly we should investigate the significance of other indicator organisms. But the system in Canada is highly successful. This includes both the plate count and the test for coliform organisms. It would seem to me a shame to abandon the coliform test completely since we have so much data on it. It will continue to be useful to us in the future even though we do start work on other indicators. We have collected a lot of data on it. I suggest that we continue as we are until we arrive at a suitable indicator organism.

MR. FORTGANG: I concur with Mr. Udell that the Public Health Service undertake this study and try to come up with a uniform market standard that should be added to the manual.*

MR. BROWN: Assuming that this could be carried through as suggested, it would take at least one season. What would we do in the meantime for a standard to be observed during the coming oyster season, particularly with relation to the New York City market.

MR. FORTGANG: Our policy is flexible. If it is agreed that the Public Health Service is studying the problem I can reasonably state that we would not apply enforcement procedures as rigidly as before. If a revised standard was possibly coming up, we could take that into consideration and could apply our policy as flexibly as possible.

MR. BROWN: I would like to propose a motion for an interim standard for next year; secondly, I would like to determine how a more definite standard could be arrived at.

I, therefore, move that this Conference propose the use of the market standard, which has been in operation between the U. S. and Canada, for the 1956-57 shellfish season.

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* Mr. Fortgang subsequently introducted a motion requesting the PHS to undertake development of a market standard. See page 33. E.T.J.

MR UDELL: This is the way the plan has been working in Canada. When there is an excessive amount of bacteria in a product, they want a complete run down on the source of the shellfish. To accept an interim standard may be all right but I think it would need to carry a provision that the shipping State would supply the market information.

DR. BYNOE: Three steps are followed: If the MPN is more than 2,400 the information is sent immediately to the Public Health Service who in turn contacts the State and the State contacts the shipper. That information is then relayed back to Canada. Mr. Jensen has made a point that must be considered. A value of 2,400 may be too low for producers from your Southern States.

MR. MEREDITH: I agree with Dr. Bynoe that 2,400 may be low. If Mr. Brown is agreeable I would like to suggest an amendment to his motion to raise it to 16,000 or 24,000.

MR. BROWN: Isn't there a provision for a second class. The standard could go up to 160,000 before they would be rejected.

MR. BYRD: There will be a very large amount of work placed on the regulatory agency if the figure is 2,400. Even 24,000 will not be quite high enough for soft shell clams.

MR. SPATH: The samples in the South are much higher than 2,400. We in Louisiana could not meet the standard as proposed.

MR. BROWN: I will be willing to amend this in any way to get something in which everybody is in favor. Use the Canada agreement but use Class II instead of Class I.

DR. BYNOE: 160,000 would be much too high a limit for Class I.

MR. FAULKNER: I see no point in setting a limit so high that it is meaningless.

DR. SHANHOLTZ: We presented organized data on that this morning. We think that our values are good. They are based on oysters from good clean areas and from good plants. Any of you are invited to come to Virginia anytime to see for yourselves.

MR. KELLY: The 16,000 as suggested by Mr. Meredith is reasonable.

MR. MEREDITH: 16,000 or 24,000?

DR. BYNOE: Almost 90% could meet the 16,000. About 60 or 65% of the ones from the Southern States could meet the 16,000.

DR. HARRIS: The MPN is even less precise in oysters than it is in water. A reasonably liberal upper value is well justified. The Virginia laboratory results may represent very easily a single population of oysters. Remember that the MPN fermentation tubes measure coliform density only indirectly. They do not actually count organisms.

MR. GIRARD: I am assuming that the interim standard will be for the Eastern oyster only. Any standard which is finalized should take into consideration the species and ecological conditions of their growth.

DR. BYNOE: Our standard is applied to all shucked oysters.

MR. SPATH: I still believe the value is too low. Does Mr. Kelly have any figures on our oysters.

MR. KELLY: We won't be in trouble. It should be clear that we're only talking about oysters.

MR. WALLACE: We should have a motion on this.

MR. BROWN: I move that this plan described as the Canadian Plan be adopted for the 1956-57 oyster season except, however, that Class I extend up to 16,000 and that Class II go from 16,000 to 160,000.

MR. JENSEN: Should we also change the plate count?

MR. KELLY: The plate count is O. K. It would not need to be changed.

DR. BYNOE: Our work indicates that 50,000 is an acceptable limit.

MR. UDELL: This motion of Mr. Brown's? Will this be a recommendation for the manual? Would we in the States use this as a legal value?

MR. BROWN: This conference after duly deliberating upon the desirability of having a market standard is taking action to devise such a standard that will be acceptable to all. Time will be required to arrive at a standard that will include everything and that would be acceptable to everyone. For the coming season only, 1956-57, an interim standard would be adopted.

MR. TAYLOR: This applies only to oysters?

DR. BYNOE: Our standard is only for shucked oysters.

MR. SHEA: There is some recommendation on this in the manual. Will this take the place of the existing recommendation as a temporary measure? Each State is now guided by the manual.

MR. JENSEN: The certification program is the joint property of the States and the Public Health Service. The Public Health Service will be guided by the wishes of this group and will recommend this standard if it is approved by the majority attending this meeting.

MR. FAULKNER: Mr. Shea, the proposal is purely an interim one for the 1956-57 season. It would be handled on an interim basis and not incorporated into the text of the manual until we have better data on which to make a decision. A proper index organism has to be determined. At least two years will be needed to do this. The interim standard might be used until that time. It seems to me we should have an expression on this question from the people who represent the receiving areas.

DR. BYNOE: I would be prepared to recommend to the Department of National Health and Welfare that the change be made in our standard.

MR. FORTGANG: I can't speak positively for our Department, but I will recommend that they also make the change.

MR. DiBATTISTA: I believe that Pennsylvania will also be willing to accept this new standard.

MR. FAULKNER: Of course, we will need to bring this change to the attention of all the States.

DR. HARRIS: The Virginia data seems to me to indicate that 16,000 may be too low. Why should 15% of the shipments be investigated? That may be due only to normal statistical variation.

DR. SLOCUM: I think we should emphasize that this standard would be applied only to oysters produced under the certification program.

MR. GIRARD: Does the existing manual show a tolerance for market shellfish?

MR. JENSEN: Not specifically.

MR. WALLACE: Mr. Brown's motion has not yet been seconded.

MR. MEREDITH: Second.

MR. WALLACE: The motion has been made and seconded. Is there further discussion? Those in favor signify by "aye". (Motion carried without dissent). We now need an expression on how we might proceed with the development of a more permanent standard.

MR. CALVELLI: I would like to ask Dr. Bynoe what Canada does with oysters which they may seize for not complying with the standard.

DR. BYNOE: Ordinarily the oysters would not be seized and the shipments not held up for the sample results. However, if found to have an M.P.N. of 160,000 or more, the shipper is put "on release". This means that future shipments will be held up while samples are tested and if unsatisfactory, sale will not be permitted.

MR. BROWN: Regarding the need for an enduring market standard. We should arrive at a mechanism this afternoon for getting work underway on that. I expect that whether the Public Health Service does this or the States do it, we should get it going. The Workshop could make a proposal for a committee.

MR. FORTGANG: I move that the Public Health Service be the agency to undertake this long-term study for a permanent market standard.

MR. MEREDITH: I recommend that this study include the production end as well as the market areas.

MR. WALLACE: In favor say "Aye". Opposed, "No". Ayes have it. It seems to me that we have made some significant progress. I will now ask Mr. Faulkner to present a summary.

SUMMARY

MR. FAULKNER: Subject to corrections from the floor, I want to first point out those problems on which no action has yet been taken, and to ask the Workshop if they wish to consider them. Mr. Brown, in laying out the objectives of the conference yesterday, pointed out three problem areas and presented suggestions as how to cope with them:

The first was the need for establishment of a committee, policy or advisory, of representatives from major associations and regional groups, who would meet periodically to consider problems which arose in connection with the program. This was discussed and deferred for later action.

Problem No. 2 dealt with the need for an administrative section in the manual which would set forth specifically the roles of the Public Health Service and the States in the program.

Development of such an administrative guide is already being considered by the Public Health Service. As it is developed it will be submitted to the States, Canada, and the industry for review and comment. If an advisory group is established it will also be submitted to them.

Problem No. 3 is the need for bacteriological standards for market shellfish.

There appears to be little need for summarizing the discussion that has just taken place with respect to the bacteriological standards. Mr. Wallace did this and the Workshop accepted without dissent his four major points. We hope that the receiving areas will accept the interim recommendation for a market standard.

One of the main accomplishments of this Workshop has been the consideration of 55 proposed changes in Part II of the manual for the sanitary control of the shellfish industry. A resolution was passed yesterday afternoon accepting these changes. We will procaed with publication.

One of the highlights of this Workshop has been the presentation of excellent technical papers on shellfish bacteriology. I think that these papers and the discussions which followed, gave all of us a much better understanding and appreciation of the problem.

The action with respect to an interim standard for the 1956-57 season will provide a means of resolving some of the difficulties of last season.

Mr. Macomber presented an excellent paper yesterday which tied in with work going on in various areas including Hampton Roads, for reclaiming and reopening areas through the construction of sewage treatment works. No action was taken on Mr. Macomber's "conditionally-approved" areas. The Workshop may wish to consider this point further before adjourning.

The effect of chlorotetracyclene in extending the shelf-life of shellfish was discussed, and considerable interest indicated. We all recognize the problem of an antibiotic residual in the product. We have as yet had no expression from Food and Drug Administration with respect to their evaluation of this particular treatment for market shellfish.

I would like to take this opportunity to express the appreciation of the Public Health Service to you for coming to this metting at your own expense. As Mr. Brown stated this is not a Public Health Service program. This is a program of the States in which the Public Health Service is playing a role. I think this Workshop has been very productive. I hope it is only the first of a series in which the States, Canada, industry and the Service can all work together to improve our cooperative shellfish program.

MR. WALLACE: Thank you, Mr. Faulkner, for the excellent summary of this conference.

There are three or four items which probably need to have final consideration. First is the policy advisory committee suggested by Mr. Brown in his presentation yesterday morning. It was the general agreement to defer final action until everyone had an opportunity to give some thought to this matter. It is in order to open up the matter again for discussion.

Mr. Brown proposed the committee be made up as follows:

Two members to be designated by Oyster Institute of North America; one to represent shellfish producers and processors; one to represent shellfish market and sales interests; one member from National Shellfisheries Association; two members from American Public Health Association; one to represent committee of engineering and sanitation section; one to represent committee of laboratory section; one member officially representing the Federal Food and Drug Administration; one member officially representing the U. S. Public Health Service; four members chosen by sub-committees from the following regions: one to represent the North Atlantic producing States; one to represent the Middle and South Atlantic producing States; one to represent the Gulf Coast producing States; one to represent the Pacific Coast producting States; one member expressly representing consumer interests (selected perhaps by the National Homemakers' organization).

MR. BROWN: I don't want to belabor this issue. I came to the conference pretty well convinced that an advisory group was desirable. I am more than ever convinced that this would be desirable. We have talked about a number of things which will require interim action. The question of market standards has been referred to the Public Health Service for investigation, but they will need our help.

The matter presented by Mr. Macomber will need a great deal of attention. The States should push the development of sewage treatment works so that shellfish areas will again be productive.

The problem discussed by Mr. Udell of sewage from small boats should be given interim attention.

At the present time if any of us take exception to anything that's done in the way of the Public Health Service policing of the program, we have no adequate provision for appeal of decisions. If we in Maryland take exception with Mr. Fletcher's decisions we can only appeal to Mr. Jensen. But it isn't the Public Health Service program anyway. We could, to our advantage, have this advisory group take into consideration the appeal of policing decisions. This is not being critical of the Public Health Service.

I, therefore, move that this group recommend the establishment of an advisory group as just described by Dave Wallace.

MR. GREGORY: Do you want this to replace the American Public Health Association Advisory Committee?

MR. BROWN: No, the APHA can have what it wants. That Committee has no official status with the shellfish program.

MR. TAYLOR: Would this be an official advisory committee to the Public Health Service or just sponsored by this group? Would the PHS pay for it, or would the States pay? Who would appoint the members?

MR. BROWN: It would be my idea that this conference would designate the character of the committee. I would leave it to the committee itself, in collaboration with PHS, to determine the official status of that committee in relation to the Public Health Service. If it appeared in the best interests of the shellfish program that this not be one of the official advisory boards of the Public Health Service, the committee would not so affiliate itself. It would be the interim executive body, as it were, of the national shellfish program.

MR. FAULKNER: In answer to Mr. Taylor with respect to PHS advisory committees. The Surgeon General appoints all formal advisory committees. Such advisory committees review problem areas, provide technical assistance, and recommend to the Public Health Service possible courses of action. If the committee was appointed by the Surgeon General they would be paid for the period the committee was meeting, and would also have their travel expenses paid. Meetings then would be called only by the Public Health Service.

The cooperative shellfish program is different from most of our other activities. It is the States' program. From our point of view, it would seem we need a committee of representatives of the States that are participating in the program. Such an ad hoc committee actually would be stronger than a formal PHS advisory committee. It would certainly have more status with the Association of State and Territorial Health Officers and the Conference of State Sanitary Engineers. The Executive Committee of the Conference on Interstate Milk Shippers is a good example of such an arrangement.

MR. JARRETT : In Mr. Brown's presentation he mentioned that regional sub-committees might be created. They would have no official status, but would work out things with regional representatives from the four areas. I certainly say his suggestion would be worthwhile. I believe it would help if each State could have one representative on each sub-committee and a Public Health Service regional man to act as chairman on those groups. This would bring in the local problems of each State. For example, there may be problems in North Carolina that South Carolina does not have. State representatives on those committees would give each State an opportunity to be heard and take part in discussion of mutual problems. With these comments I would like to second Mr. Brown's motion.

MR. LEE: I understand the membership of the committee isn't definitely set up but I would like to suggest that the Fish and Wildlife Service and probably the National Fisheries Institute be represented on the committee. Perhaps industry is somewhat in the minority as far as representation is concerned. It might provide a little better balance to the committee as a whole.

MR. WALLACE: It was also suggested yesterday that Canada also be represented on such a committee. If there is no further discussion we can now vote on this proposal. All in favor of the motion to establish this committee signify by saying "aye". (Motion carried without dissent). We must now select a committee and determine how it is to function.

MR. BROWN: I would like an elaboration on the rôle of the National Fisheries Institute with regard to the shellfish program.

MR. WALLACE: The National Fisheries Institute has some members in the oyster and clam producing business.

MR. BYRD: We represent the interest of the industry on a national basis as far as shellfish are concerned.

MR. BROWN: I would not be averse to recommending, and so move, that in addition to the membership listed, provision also be made for membership from Fish and Wildlife Service, National Fisheries Institute, and a national representative from Canada.

_________: Second.

MR. WALLACE: It has been moved and seconded that the committee be composed of members as suggested in the original proposal plan; one from Fish and Wildlife Service, one from National Fisheries Institute, and one from Canada.

DR. BYNOE: I am wondering about Canadian representation. If it is an advisory group to the Surgeon General, what would be involved?

MR. FAULKNER: Canada's representative would have an observer status, the same as the PHS representative.

There is one further point re Mr. Brown's proposal I would like to mention. I understand the committee would be a review and policy group for the cooperative program for the certification of shellfish shippers. Of the 12 members, three would be from industry, two from American Public Health Association, one from Food and Drug Administration, one from U. S. Public Health Service, and one from the Homemakers' organization. Whis would provide for only four representatives from the States who have the actual responsibility for carrying out the program. This could lead to a difficult situation if a vote was taken in regard to a problem in a State. The States might feel that such a vote was unfair since only four of the twelve members represented State governments.

MR. BROWN: I am glad that John brought up the point. Actually there is nothing in this to prevent the American Public Health Association representatives from being members from the States. On the other hand that might not be. Actually I do not believe that a committee of this sort should be set up to determine which way the votes should go in a pinch. This shouldn't be something that should be controlled exclusively by weight of numbers. We need to assume, and I believe we could do so very readily, that broad selection of representation on such a committee would represent the interests of all concerned. There will be official State representation on the committee which I think would be able to voice, in the consideration of such a group, the interests of those in the State which administer the program.

MR. FAULKNER: The greatest criticism of the old Public Health Service milk and food advisory group was that cities and States were not adequately represented. I think now is the time to discuss this. Under the proposal, decisions of this committee would be more or less binding on the States. Who does this committee represent?

DR. SHANHOLTZ: Whom will they advise? I can see the value if it really works and could advise the States. That would be a reasonable function for such a committee, but with no more State representation on the committee proposed would they want to speak for all the various interests? Such a committee might recommend, but I think that formal policy is best handled by a responsible group with authority to speak.

MR. GIRARD: Perhaps we are moving too fast. How could the West Coast best fit into the picture on a national basis? I would rather not speak on how Washington, Oregon and California might best be represented.

MR. TAYLOR: I believe it is best for the Public Health Service to set up an advisory committee on its own. How can the Association of State and Territorial Health Officers function if they are going to ask the

American Public Health Association and Homemakers Institute to take part. As originally specified it would be under the framework of the National Conference on Shellfish Sanitation.

MR. FAULKNER: Could this committee have about the same representation as a steering committee for future Workshops. They could consider the problems and recommend that the Workshop take formal action. Then all of the States would have a voice.

DR. SHANHOLTZ: That is my idea, too. The States are the ones that have the responsibility. The Public Health Service does not really need an advisory group. Major policy would still have to be made by the States. Problems could be presented to the Public Health Service and they could study them and be instrumental in calling meetings.

MR. BROWN: My objective is to push the development of a body that can serve in an interim capacity. These suggestions are well within that objective.

MR. WALLACE: We still have the motion on membership. It is moved and seconded that the committee be composed of the group recommended by Mr. Brown, with the addition of the Fish and Wildlife, National Fisheries Institute and Canadian representatives. All in favor of the motion, signify by saying "aye". Opposed "no". (Motion defeated). I might suggest that we appoint a three man committee to study this matter and to recommend membership on the committee.

DR. BYNOE: I still think that we must first take action to determine who the committee is to represent.

_________: Why not leave the matter as it is with no composition for the committee. Each agency could appoint a committee member. Each producing State would select a representative.

MR. TAYLOR: I think that would not be workable.

MR. JARRETT: These mem who are to represent the areas--who would appoint them? The Surgeon General or the Association of State and Territorial Health Officers. The only thing that is specifically stated is that there be designated some person from each State who would serve on a sub-committee, and who would officially represent each State.

MR. MACOMBER: Why can't proxy voting be used? Each State would have a vote even if they could not attend the meeting. This Workshop is an example of the problem in arriving at a group opinion representative of all the participating States. Nearby States have several representatives while those farther away have no representation.

MR. WALLACE: Our group has dwindled to a point at which we can no longer make a real group decision.

MR. JENSEN: I would like to suggest that we go on record as recommending that a steering committee be established to plan for a shellfish sanitation workshop to be held about one year from now. We will need to meet anyhow to discuss the interim standard. The steering committee could plan for the workshop, select dates, and so on.

_______: I move that Mr. Jensen's recommendation be accepted.

_______: I second it.

MR. WALLACE: It has been moved that a steering committee be selected to set up another Workshop one year from now. Any discussion? All in favor say "aye". Opposed? None. The motion is unanimously adopted.

DR. SHANHOLTZ: I move that Mr. Wallace appoint a committee.

_______: Seconded.

MR. WALLACE: It has been moved that the chairman set up a steering committee. All in favor say "aye". Opposed? None.

We still have the question of establishment of conditionally approved areas as proposed by Mr. Macomber. Is there any action at this time?

MR. TAYLOR: I don't think there are enough of us here to take action.

MR. WALLACE: I would like to entertain a motion for a resolution recognizing the speakers who have prepared papers. (Moved and seconded from the floor). It has been moved and seconded that an appropriate recognition of the contributions of the speakers be made by the Public Health Service in the name of the Workshop. All in favor, signify by "aye". (Motion adopted without dissent). I will now entertain a motion to adjourn the conference.

Meeting adjourned.

Discussion of Proposed Changes in the PHS Manual of Recommended Practice for Sanitary Control of the Shellfish Industry

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These discussions are keyed to the numbered items in the paper presented by Mr. Jensen on the proposed changes in the manual. Discussions took place during the morning and afternoon sessions on August 27. E.T.J.

Suggested Changes 1 & 2, page 2. unanimously adopted.

Suggested Change 3, page 2:

MR. GREGORY: Would wet storage include floating?

MR. JENSEN: No. That would be in Part I. In the old manual wet storage and floating are defined separately. It is very vague as to distances and depths.

MR. GREGORY: I agree. But floating is essential in Maryland and Virginia. "Floating near shore" is not adequately defined. No definition is given for "shallow water". Floating should be in here.

MR. JENSEN: The technical problems in floating are different from wet storage, but we could handle them either way. Wet storage deals with plant sanitation, and is defined as "The temporary storage of shellfish from approved sources in tanks containing sea water". We suggest adding to Section B, "Wet storage will not be practiced unless written approval is given by authorities, etc." This would eliminate any reference to "near shore" since it is impossible to define just what we mean by "near shore".

MR. GREGORY: I think you should put wet storage and floating together as the parallel is so close.

MR. JENSEN: In Part II or Part I?

MR. GREGORY: What do you intend to include in Part I?

MR. JENSEN: Sanitary surveys and general engineering practice, etc.

MR. GREGORY: Actually floating and wet storage are processes. Floating should be in Part II.

MR. MACOMBER: This change includes floats.

MR. JENSEN: Is it all right if the definition is amended to include floating. This deletes the "near shore" in the old manual.

MR. GIRARD: Did the old manual refer to the movability of floats?

MR. JENSEN: Yes. Is it the consensus that this item should be expanded to include "floats"?

MR. HOBBS: I move that it be included.

MR. GREGORY: Seconded.

MR. FAULKNER. "Ayes" have it.

Suggested Change 4, page 3.

MR. WESTON: Delete it. Use the words "may be". False bottoms are impractical on little boats. They are not needed.

MR. JENSEN: I have used the word "ordinarily" to allow for that.
MR. GREGORY: This is the point. The term "false bottoms" implies a duckboard--some structure or platform where the oysters in storage will be out of the bilge water.
MR. FLETCHER: It works all right in our States.
MR. WESTON: If you can get them to take the false bottoms out once in awhile.
MR. KELLY: Is there any objection to the wording in the 1946 manual? You believe there is no potential danger?
MR. WESTON: A row boat in a polluted area is evidence that he has polluted oysters.
MR. KELLY: The point is to separate the highly contaminated water from the oysters.
MR. WESTON: If the oysters come from non-polluted waters where would you get pollution?
MR. KELLY: There is always a multiplication of bacteria. You would be surprised to know the bacterial content of that water.
MR. FLETCHER: We are talking about small boats that come out of approved areas and go through polluted areas. We have to do something about those.
MR. FAULKNER: Any more remarks? Can it be amended to read "in polluted areas"?
MR. KELLY: Doesn't the present wording allow some leeway in judgment?
MR. WESTON: I withdraw my objection.
MR. FAULKNER: Is there a motion to accept the recommendation as presently worded?
MR. GREGORY: What was the sentence that Mr. Kelly used?
MR. KELLY: Its in the old manual. I used it to clarify it.
MR. FLETCHER: Then they have to have false bottoms. We wouldn't permit the boat to have water in it. We wouldn't permit that in a shell stock storage room.
MR. FAULKNER: All in favor of adopting it as stated, say "aye". None opposed.

Suggested Change No. 5, page 4.

MR. TAYLOR: We have made some limited investigation on this in Massachusetts. We have no real conclusion. The gist of it is, you couldn't tell the difference.
MR. MACOMBER: What about breakage? Wasn't there a lot of breakage in sacks?
MR. TAYLOR: Yes. There was a lot of breakage.
MR. KELLY: We found that it doesn't make much difference what type of container is used. The important thing is to provide the right storage situation. There is one disadvantage that they do create a more concentrated pile of material. It might complicate refrigeration. We found that with the New York mussel and with Massachusetts mussels that bacteria increases during transportation in the same degree in the baskets as in the sacks.
MR. HOMANS: We reached the same conclusion as Mr. Kelly. We haven't found any difference in sanitary point of view but there is considerable breakage in sacks.

MR. KELLY: Wouldn't get much contamination from the sacks.
MR. FAULKNER: Recommendation No. 5 unanimously adopted.

Suggested Change No. 6, page 4.

MR. BROWN: Why put this in?
MR. WALLACE: It is highly impractical.
The recommendation was deleted unanimously.

Suggested Change, No. 7, page 4.

MR. HOBBS: Doesn't it conflict with the statement on page 22? My point is this. Is the State going to be marked down on this? We have done a small amount of examination. We have found it better when the mud is on then washing the oysters.
MR. KELLY: I think one of the arguments for shell stock washing is to be practical. The cleaner the product you present to the shucker, the cleaner will be the shucked product. I believe if we can remove a practical amount of mud from the oyster we will insure a product which is that much cleaner. In our laboratory results, we have found that there is a terrific increase in the coliform content in the mud on the shell stock, and that this increase takes place in a very short time. It takes place while the oysters are on the deck of the boat. The increase is in the order of 100 to 1. It is a question of cleanliness and wholesomeness of operation and it certainly does contribute to a cleaner product if we can remove the mud. In South Carolina, because of the nature of the oyster and the fact that it is imbedded in mud, you have a very difficult problem in the removal of the mud. I believe that is why the word "reasonably" is put in there. But I don't like to leave it to the discretion of the State regulatory agency. Then you may have as many standards of operation as you have harvesting States.
MR. GIRARD: About 90% of our oysters do receive washing before processing. The 10% that do not are hand picked. They do not have facilities for washing. I haven't seen too much difference between the washed and unwashed. The washed oysters certainly make it easier to keep the plant cleaner.
MR. WESTON: We have 100% hand picked. We don't allow dredging.
MR. GREGORY: I move we adopt the recommendation (1) on page 4. That the word "reasonably" be left in here.
Unanimously adopted.
MR. JENSEN: How about the second part which now reads, "Dip tanks are not used for shell stock washing"?
MR. MACOMBER: In the sea clam industry it is standard practice to dip the clam in a hot water dip and cold dip for other reasons than washing.
MR. UDELL: Does this refer to use of dip tanks? We will have to object to it. We have a large surf clam industry. They have been doing this for years and the precedent has been set. We find that we can keep the bacterial content down.
MR. JENSEN: How often do you have to change water in the dip tanks.
MR. UDELL: Four times a day.

MR. TAYLOR: We use it very frequently in Massachusetts in the shellfish treatment plant. We control bacteria by using free chlorine residual. We only use the tank for that. We are talking about tanks 5' deep, 5' wide, and 25' long. Those tanks would probably be used for 150 bushels of shellfish.
DR. BYNOE: Some of the members of our laboratory worked on it. But I am not sufficiently well acquainted with it to give any worthwhile information on it at this time.
MR. JENSEN: Should we delete the item or change it in some way?
MR. KELLY: If this is a practice that is common, we should stipulate the conditions under which it should be conducted. I am inclined to agree with Mr. Taylor that the chlorine process used would not be a hazardous thing.
MR. TAYLOR: I think it would be well to put in some condition.
MR. KELLY: I think it goes beyond a bacterial limit. I believe we should stipulate the conditions under which this process is to be done. The design of this process and the stipulations can be so arranged in a feasible way so that it would not be potentially dangerous. One is the following-through tank process. Another is the frequency of changing the water. You limit the number of exposures to the water.
MR. FAULKNER: Does anyone make a motion that we leave it as it is?
__________: I move we do not accept the second part of this recommendation.
__________: Seconded.
Carried unanimously.

Suggested Change 8, page 5.

Limited discussion. The recommendation unanimously accepted.

Suggested Change No. 9, page 5. Unanimously adopted.

Suggested Changes No. 10 through 13, pages 5 & 6. Unanimously adopted.

Suggested Change No. 14, page 6. Delete the word "separate". Unanimously adopted.

Suggested Changes 15 through 25, pages 7-10. Unanimously adopted.

Suggested Change No. 26, page 10.

MR. GREGORY: I realize that these items are mentioned in the reference. I think that it would be helpful if you would just mention in the item the need for self-closing doors and fly tight construction. You don't have to include the whole leaflet.
MR. JENSEN: I have no objection to including a statement such as that. Recommendation, as amended, unanimously adopted.

Suggested Change No. 27, page 10. Unanimously adopted.

Suggested Change No. 28, page 10.

MR. HOMANS: Has hard rubber been tried? We instituted a search for a substitute and finally came up with a satisfactory one for lobster plants. They use nothing but rubber blocks. They have been used for four years, and are still serviceable. The block costs $2.50 and measures 10" x 7", and is 2 inches thick.
MR. GIRARD: About 75% of the openers in our State use aluminum. The block lasts for many years.
MR. JENSEN: I think we should investigate their possibilities. However, I do not think we should require them at this time.
Recommendation unanimously adopted.

Suggested Change No. 29, page 11.

MR. KELLY: I agree on the part about knives, but I do not think we should permit dip buckets. The continued use of stale water offers a potential danger especially when the water is kept warm. The solution of the problem is simply the installation of a water line with one faucet for every other shucker.
MR. MEREDITH: We have one plant in Virginia where a water line has been installed.
MR. WALLACE: The volume of water in many of our oyster plants is already a critical item. This would greatly increase this problem.
MR. FAULKNER: A motion on the second item, on dip buckets. It has been moved and seconded that the use of dip buckets be prohibited and that the entire recommendation be accepted.
Recommendation unanimously adopted.

Suggested Changes 30 through 36, pages 11-14. Unanimously adopted.

Suggested Change No. 37, page 14.

MR. WALLACE: Does this mean that all shucking benches would have to be washed down with hot water? If so, I think it is quite impractical because of the need for such a large quantity of hot water. I know of no studies that would show a need for this.
MR. JENSEN: As written, the item would require the use of hot water and detergents in plant clean-up operations.
MR. GREGORY: I think that our present provisions that require clean-up within two hours are quite adequate.
_________: Are there adequate reasons for specifying that hot water be used? We all know that you have to have a detergent if you want to clean effictively, but I think that the use of hot water is unrealistic. I move we accept the recommendation if the reference to hot water is removed.
___________: Second. Unanimously adopted.

Suggested Changes Nos. 38-48 inclusive, pages 14-17. Unanimously adopted.

Suggested Change No. 49, page 18.

There was a limited discussion of this item. It was decided that the recommendation should be accepted for the smaller containers, but that there was justification for requiring that the identification information be placed on the sidewall of containers holding a gallon or more, except in those cases in which the cover became an integral part of the container during the sealing operation. The recommendation, as amended, was then unanimously adopted.

Suggested Changes 50, 51, and 52, pages 18-19. Unanimously adopted.

Suggested Change No. 53, page 19.

There was no objection to the provisions for the source and handling of the ice. However, there were several objections to the requirement that special facilities be provided for the washing of ice. It was believed that the methods for washing ice should be left to the discretion of the processor. The final sentence of the recommendation was therefore deleted.

The recommendation, as amended, was then unanimously adopted.

Suggested Changes 54 and 55, pages 19-20. Unanimously adopted.

MR. BROWN: We have now completed our consideration of the proposed changes in the shellfish manual. We have acted on each of the proposed changes. I think it would now be appropriate to have a motion accepting the manual, as revised by this Workshop, as a replacement for the present Public Health Service publication. (The motion was made and seconded, and carried without dissenting votes).

APPENDIX A

OBJECTIVES OF THE 1956 SHELLFISH SANITATION WORKSHOP

by

ROBERT M. BROWN

The national shellfish control program has now been in operation for more than thirty years. Its nature and accomplishments were thoroughly reviewed at the second National Shellfish Conference held here in Washington in 1954. The 1954 Conference attested the worth and effectiveness of the program and strongly endorsed its continuation. My remarks will not include, therefore, a review of either the shellfish control program or the 1954 Conference since I have assumed that those of us here today are relatively well acquainted with both.

We readily subscribe, I believe, to the usefulness of the control program irrespective of whether our interests are primarily sanitation or marketing of shellfish. With equal readiness, however, each of us can doubtless cite areas of weakness or less than satisfactory operation which we should like to have remedied for our individual or collective benefit. The 1954 Conference pointed up the need for a number of refinements in administrative and technical procedures. Many persons have subsequently devoted considerable time in efforts to accomplish the desired improvements. This Workshop has been arranged in order to facilitate further progress in the determination of policy and technical procedures.

In May of this year, with the collaboration of Mr. Eugene Jensen, I presented to the Conference of State Sanitary Engineers a report on the national program for shellfish control as it might concern operations or responsibilities of the State Sanitary Engineers. Eight administrative and technical procedures currently needed to improve the effectiveness of the program were noted. I repeat them here to offset any possible inclination we might have toward complacency or relaxing of effort.

A. Administration

1. Development of policy and standards on the national level to regulate the importation of fresh and frozen shellfish from beyond the continental United States and Canada.

2. Initiation of procedures by receiving States to ascertain that all shellfish brought into them for direct sale, repacking or processing are from certified sources.

3. Development of an understanding of confidence and mutual reliance between producing and receiving states to increase recognition and prestige of program.

4. Establishment of an active continuing and representative review and policy advisory group (from producing and receiving States) to assist the U. S. Public Health Service in program surveillance and evaluation.

B. Technical

1. Engineering:-Definition of the nature and extent of mechanical and administrative controls which will be necessary to accomplish with safety the reduction in size of areas restricted for the harvesting of shellfish following the construction of sewage treatment works.

2. Bacteriological - epidemiological:-Establishment of a procedure for determining valid bacteriological or other index of quality of market shellfish.*

3. Bacteriological - epidemiological:-Establishment of a procedure for periodically reevaluating the nature and level of bacteriological standards for shellfish growing areas.*

4. Biological - toxicological: - Completion of research development of an official method for bioassay or colorimetric determination of paralytic shellfish poison.

*No correlation has as yet been established between bacteriological values obtained on shellfish from approved growing waters and the suitability of such shellfish for use as food.

In turning more directly now to the objectives of the 1956 Workshop, I should like to review briefly three problems which require immediate attention in order to meet current demands for program refinement. Two of the problems are administrative and one is both administrative and technical.

Problem 1. The national program for shellfish control is a cooperative activity between States (in which industry is given a voice) coordinated and periodically evaluated by the U. S. Public Health Service. Although the Public Health Service must on occasion assume the role of policeman, it does not "run" the program nor does it "own" it in the sense it would were it a Federal program. The Service does not establish, on its own, the basic policies and regulatory procedures which must be observed. Initial program concepts, policies and procedures were determined by the first national conference in 1925. All decisions regarding program modifications or additions in the interim between the first and second conferences had to be made by the laborious process of "round robin" correspondence and written polling of representatives of the States. Such has also been the case following the 1954 conference. It is a situation producing obstacles and frustrations for all concerned. An objective of this Workshop is to discuss the desirability of devising a review and policy advisory group (committee or board) to act for the States and work with the Public Health Service in administering the national shellfish control program. Such a body would eliminate necessity for frequent national conferences to determine policy or the discouraging process of making such determinations by correspondence polls. With such an operative body a national conference every five to ten years to review, evaluate and check orientation of the program would suffice. This latter type conference would hopefully be able to view the program in broader perspective without having to devote its time to operational details.

Proposal for dealing with Problem I: It is suggested that a representative committee of not more than twelve members be selected to serve the purpose described in the preceding discussion. Included in membership should be representatives of industry, professional associations and the official agencies. Geographic representation should be accomplished since shellfish problems vary according to location of the producing areas. The interests of inland shellfish consuming states should be assured a voice.

Composition and selection of the committee might be as follows, amounting to a total of 12 members:

2 Members to be designated by Oyster Institute of North America
- 1 to represent shellfish producers and processors
- 1 to represent shellfish market and sales interests

1 Member from National Shellfisheries Association

2 Members from American Public Health Association
- 1 to represent committee of Engineering and Sanitation Section
- 1 to represent committee of Laboratory Section

1 Member officially representing the Federal Food and Drug Administration

1 Member officially representing the U. S. Public Health Service

4 Members chosen by subcommittees from the following regions
- 1 to represent the North Atlantic producing States
- 1 to represent the Middle and South Atlantic producing States
- 1 to represent the Gulf Coast producing States
- 1 to represent the Pacific Coast producing States

1 Member expressly representing consumer interests (selected perhaps by the National Homemakers' organization)

The idea of regional subcommittees might be discussed briefly. The subcommittees would not be subdivisions of the main committee nor have interlocking membership other than the designated representatives on the main committee. The subcommittees, however, would serve the important purpose of providing a mechanism for proposing desired regional policies and standards for later review and decision of the main committee. A method of organizing the subcommittees and selecting appropriate members might have to be worked out in several of the areas. A "natural" for this purpose already exists for the Middle and South Atlantic area in the form of the annual Seafood Seminar.

I will rest the proposal at this point except for a brief reference to status of the main committee and its membership. Membership (following selection as indicated) should be by appointment of the Surgeon General for a specified period. If such a committee is to serve effectively, its members _must_ be interested and active. Provision should be made for prompt replacement of any member not measuring up in either respect. The precise relationship of the committee to Public Health Service activity would have to be developed in conference with Service officers.

Problem 2. In general the technical operations and standards of the national shellfish control program are understood by State and local agency personnel and members of industry. This is due in very large measure to the Shellfish Manual, Parts I and II which detail compliance requirements for both program and dealer certification. On the other hand, there appears to be a widespread lack of understanding of the role played by the Public Health Service, the nature and extent of its responsibilities, the procedures followed in arriving at program ratings, the basis for withholding or withdrawing program endorsement, etc. In all probability this is largely due to a lack of a manual, or section of one, dealing with such administrative matters. Since this is, in my judgement, a problem readily recognized, I will not detail it further.

Proposal for dealing with Problem 2: It is suggested that early arrangements be made to assemble in manual form a description of the role played by the Public Health Service in coordinating and policing the national shellfish control program. This should desirably delineate at the same time responsibility of the States in meeting program requirements and in exercising intrastate control. (It should be noted that this problem has already been recognized by the Public Health Service and that plans for preparing such a manual are being made.)

Problem 3. The increasing demand for development of a valid bacteriological or other index of quality of market shellfish has probably been of greater influence than any other factor in assembling this 1956 Workshop. The fact that the second day of this meeting is substantially devoted to discussion of this issue reflects the extent of interest in a desired practical tool. Since those of you who are scheduled to speak on tomorrow's program will advance proposals for dealing with the problem, I can confine myself to stating that consideration of the need for a market standard is a principal objective of this meeting.

I know you will understand that in not mentioning all items listed on the agenda there is no intention of minimizing their importance. I have attempted to point up the primary objectives of the Workshop for your better understanding of requirements for more perfected operations in the future. Your searching discussion of these objectives is invited.

APPENDIX B

TREATED SEWAGE DISCHARGES

INTO

SHELLFISH GROWING WATERS

Prepared for National Shellfish Sanitation Workshop
August 27--28, 1956
Washington D. C.

Ronald Macomber
July 1956

INTRODUCTION

> "The sanitary survey shall disclose no likelihood that human fecal discharges reach the area in dangerous concentrations or before sufficient time has elapsed to render such discharges innocuous."
> "Manual of Recommended Practice for Sanitary Control of the Shellfish Industry" -- 1946

Has the discharge of treated sewage into shellfish growing areas, fostered by the desire for water pollution abatement, introduced any problems into the application of a cooperative shellfish sanitation program? The experience of the Public Health Service shellfish sanitation consultants would indicate that the practice of discharging treated sewage into shellfish growing waters has indeed created problems requiring guidance beyond that contained in the 1946 manual. The problems are not only facing the personnel responsible for conducting the cooperative shellfish sanitation program at the operating level, but the lack of spelled out design criteria places the designing engineer in a dilemma when faced with the problem of meeting a water quality criteria adequate for shellfish marketing.

Take the case of one large metropolitan area where a vigorous water pollution abatement program had established high levels for the treatment efficiency of sewage treatment plants discharging into tidal waters. One of the selling points for this high level of treatment was the expected benefit to be received from the opening of large shellfish areas. However, after the completion of the construction, the shellfish sanitation agency did not permit any change in the previous closed areas. The shellfish sanitation agency took the stand that combined sewers overflows which discharged into the area would not permit a dependable uniformity of treatment.

A variation in this problem was encountered in another area where a sewage treatment plant was constructed for the purpose of providing water quality adequate for use as market shellfish area. In this case it was later found that automatic by-passes at pumping stations located in the sanitary sewer system at a point nearer the shellfish beds than the treated sewage outfall occasionally discharged raw sewage as a result of mechanical failure to pumps. Special alarm and recording devices were specified along with certain restrictive administrative practices to ensure immediate warning and closure of affected areas.

In a cooperative state-federal program such as the shellfish sanitation program, there is the need for some generally accepted "guide lines" to serve both the operating and the reviewing agencies. For example, although there may be some differences of opinion as to what temperature shucked shellfish should be cooled to, before shipping, for purposes of the cooperative program a definite value has been decided upon. There is no such comparable uniformity used in the study and evaluation of sanitary conditions of growing areas. For example, in meeting the problem of classification of growing areas, one state has adopted the general practice of not approving any shellfish area which is not at least one tidal distance away from sewer outfall (distance measured by float travel during critical tide condition.) Certainly this is not a condition peculiar to the local hydrographic conditions, but is definite criteria for the manual recommendations regarding "The relative freshness of sewage discharges as determined by the lapse of time between such discharges and their arrival in the shellfish area." Should such a practice be uniformly applied as a technical interpretation of the enumerated general recommendation?

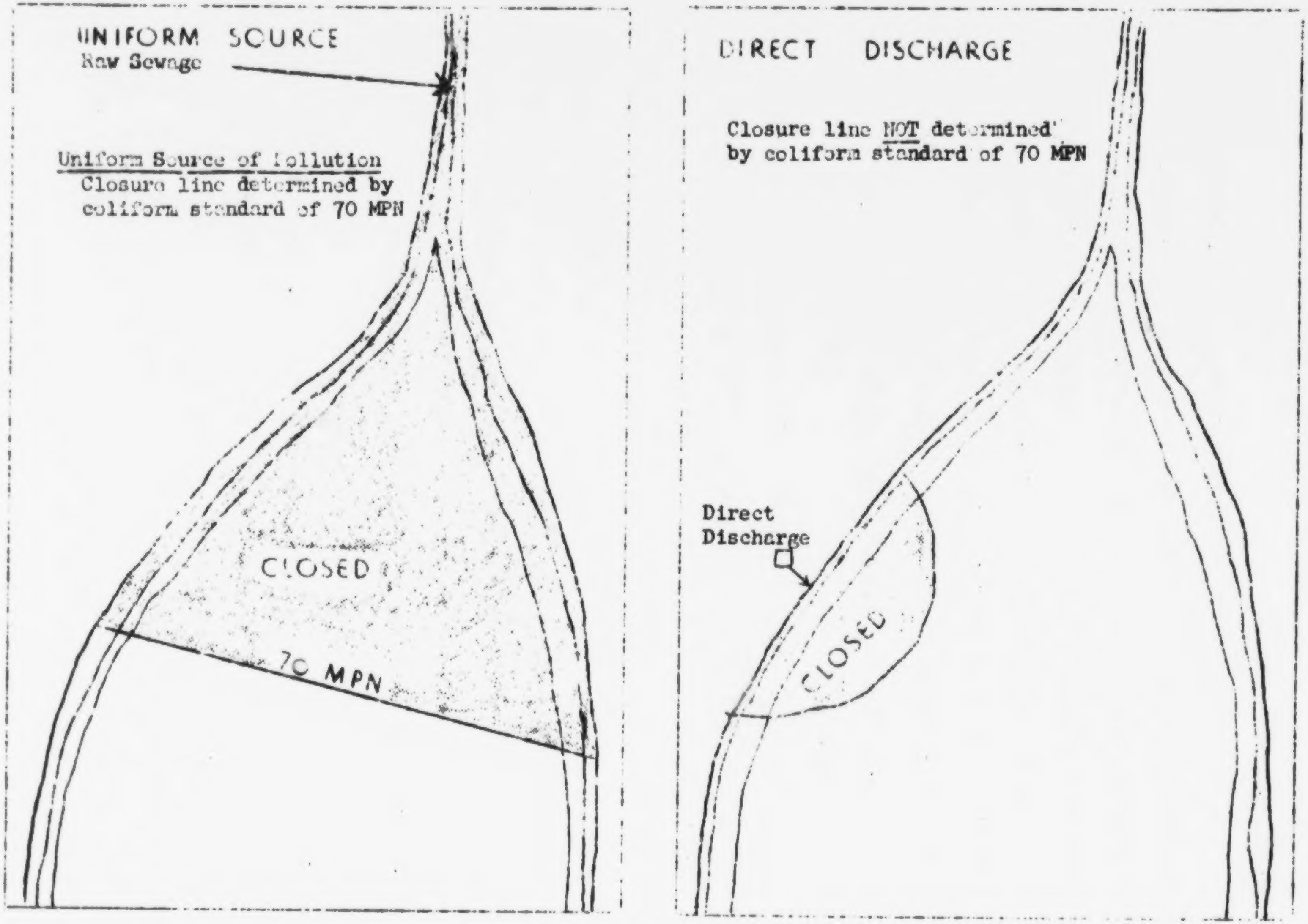
The problems which are posed in this presentation are "Should criteria governing the discharge of treated sewage into shellfish waters be adopted for the guidance of the designing engineer, the operating state program and the reviewing Federal program?" and if the answer is in the affirmative then "What should be the criteria contained in the manual of recommended practice?" This is a question of uniformity with which you would be willing to be in conformity.

The following presentation has been prepared in answer to a request for a rough "working" paper to serve as a stimulus for discussion. Since the writer does not make any claims for the complete authenticity of the reported generalizations, it is hoped that errors, from whatever source, will merely serve as the jumping off point for the discussion and not the point for jumping on the writer.

I. PRESENT PRACTICE (Ref. Fig. I)

Realizing that in making any generalization a person runs the risk of someone shooting a few holes into it with the "exceptions," the present practice associated with the sanitation of growing areas is considered to be based on the fact that the source of pollution is uniform both as to quality and quantity. This is expressed in the 1946 manual by the statement "These samples shall have been collected throughout the suspected area during one or more active shellfish seasons during which conditions as disclosed by the sanitary survey shall have remained practically unchanged."

The first step in an area classification study is a sanitary survey of pollution sources. For relatively large pollution sources the second step is to determine the efficiency of the receiving waters as a sewage treatment process. This second step is performed by determining how much of the receiving water is needed to treat the discharged sewage to a degree such that the median coliform content will be 70 MPN or less. Unless, as specified in the above statement in the manual, the pollution sources are uniform during this period of study the determination of the 70 MPN is meaningless as a determination of the treatment efficiency of the receiving waters. The variables which are to be accounted for in the study are those related to the receiving water, namely temperature, currents, tide, etc. and not variations in the pollutant source. This is not saying that the treatment efficiency studies of the receiving waters could not be designed to take into account variations in the pollutant source, but merely that present practice in the program as spelled out in the present


UNIFORM SOURCE
Raw Sewage
Uniform Source of Pollution
Closure line determined by
coliform standard of 70 MPN
CLOSED
70 MPN
DIRECT DISCHARGE
Closure line NOT determined
by coliform standard of 70 MPN
Direct
Discharge
CLOSED

PRESENT PRACTICE
Fig. I

manual does not make provision for such an evaluation. The use of a bacteriological study of receiving waters to merely find the line where the median value of a series of tests is 70 MPN or less depends upon the assumption that the pollutant source is uniform during that period of study.

In the conduct of growing area classification studies the source of pollution has been considered of two types depending upon whether a coliform standard will give an indication of the relative safety of the growing area in terms of the pollutant source or not.

Coliform Standard Indicative of Relative Safety

$$\frac{\text{Number Coliform organisms}}{\text{Number Pathogenic organisms}} = \frac{\text{Population x Coliform excretion rate per person}}{\text{Number Carriers x Pathogen excretion rate per carrier}}$$

The above statement of a relationship does not indicate the effect of any natural growth or die-away in the environment outside of the human body. As reported in the study "Some Notes on the Relation between Coliforms and Enteric Pathogens" by Kehr and Butterfield the rates of destruction or death of the coliforms and the rate of their removal from water or sewage is parallel to that of the pathogenic enteric bacteria for the same environment.

For the purpose of indicating the relative magnitude of the values in the above expression the following example is given for a population of 100,000:

Coliform excretion rate per person - "125 to 150 billion in winter" and "close to 400 billion in summer" per day

S. typhosa excretion rate per carrier - "200 billion per day"

(Note: The above values taken from "Water Supply and Waste-Water Disposal" by Fair and Geyer)

According to information in "Preventive Medicine and Hygiene" by Rosenau:

> "From 2 to 4 percent and sometimes more of all cases continue to discharge typhoid bacilli indefinitely; these are active chronic carriers."

Taking a community with a 40 year average of 13 cases of typhoid per year per 100,000 population, the number of carriers would be 10 per 100,000.

$$\underset{\text{(Cases per year per 100,000)}}{13} \times \underset{\text{(No. years avg. carrier)}}{40} \times \underset{\text{(\% carries)}}{0.02} = 10.4 \text{ carries per } 100{,}000 \text{ population}$$

Thus for a population of 100,000 the Coliform Pathogen ratio would be:

$$\frac{\text{Number Coliform}}{\text{Number Pathogen}} = \frac{100{,}000 \times 200 \times 10^9}{10 \times 200 \times 10^9} = \frac{100{,}000}{10} = \frac{10{,}000}{1}$$

This very rough and perhaps far from accurate presentation has been made for the purpose of indicating the following factors regarding the present use of the coliform test and more specifically a 70 MPN value for administratively determining the boundary line for shellfish waters:

1. Coliform Standard Dictated by Expediency - As long as the standard permits the presence of coliforms the presence of human sewage is admitted and permitted to a certain degree and the possibility of chance cases of enteric disease spread by this cause is not without possibility. The determination of how many sewage organisms will constitute "contamination" is an administrative decision depending upon the evaluation of the cost of relative safety.

2. Evaluation of Relative Safety Dependent Upon Enteric Disease Rate - For a given coliform standard the possible number of enteric organisms and thus, the possibility of the spread of disease by this cause, would be related to the prevalence of water-borne disease in the region affected. For example, a 70 MPN for shellfish growing in a country with high enteric disease rate such as Japan would not provide the same degree of relative safety as shellfish taken from 70 MPN areas in this country, all other factors being equal. Often times this important consideration is lost sight of in the use of coliform standards.

3. Pathogenic Organism Test Impractical - The relative scarcity of the pathogenic organisms compared with the coliform organisms make it impractical for use in terms of volume of sample required. It is about like trying to count the number of needles in a haystack when we only have to count the number of haystacks to obtain a value for the number of needles.

Coliform Standard Not Indicative of Relative Safety

Continuing the analysis of the use of the coliform test above it may be seen that the coliform standard is indicative of the possibility of pathogenic bacteria only if the sewage source is relatively large and homogeneous. For instance, if a carrier did not form part of a relatively large population, but was a member of a four person family whose sewer discharged into shellfish waters, the waters might easily comply with the administrative value of 70 MPN and at the same time contain a high concentration of pathogenic organisms.

$$\frac{\text{Number Coliforms}}{\text{Number Pathogens}} = \frac{3 \times 200 \times 10^9}{1 \times 200 \times 10^9} = \frac{3}{1}$$

In effect methods are presently practical for evaluating bacteriologically the relative danger from large well mixed sources of sewage discharge but are not applicable for evaluation of small volume direct discharges. The present manual recognizes this difficulty by the following statement:

> "If the sanitary survey discloses that the area is either obviously subject to gross pollution by direct discharge of sewage and other wastes, or demonstrably exposed more or less continuously to even slight direct contamination with human fecal discharges from nearby sources ashore, or if an area usually of good quality, is exposed to occasional direct and immediate contamination with human fecal discharges, or *********, then such area may be declared to be grossly polluted area from which the taking of shellfish for market purposes shall not be permitted."

In the interest of uniformity and as an aid in program evaluation, it would appear to be desirable to also provide some suggested "guide lines" for use in determining the extent of area to be closed as result of "direct" discharges.

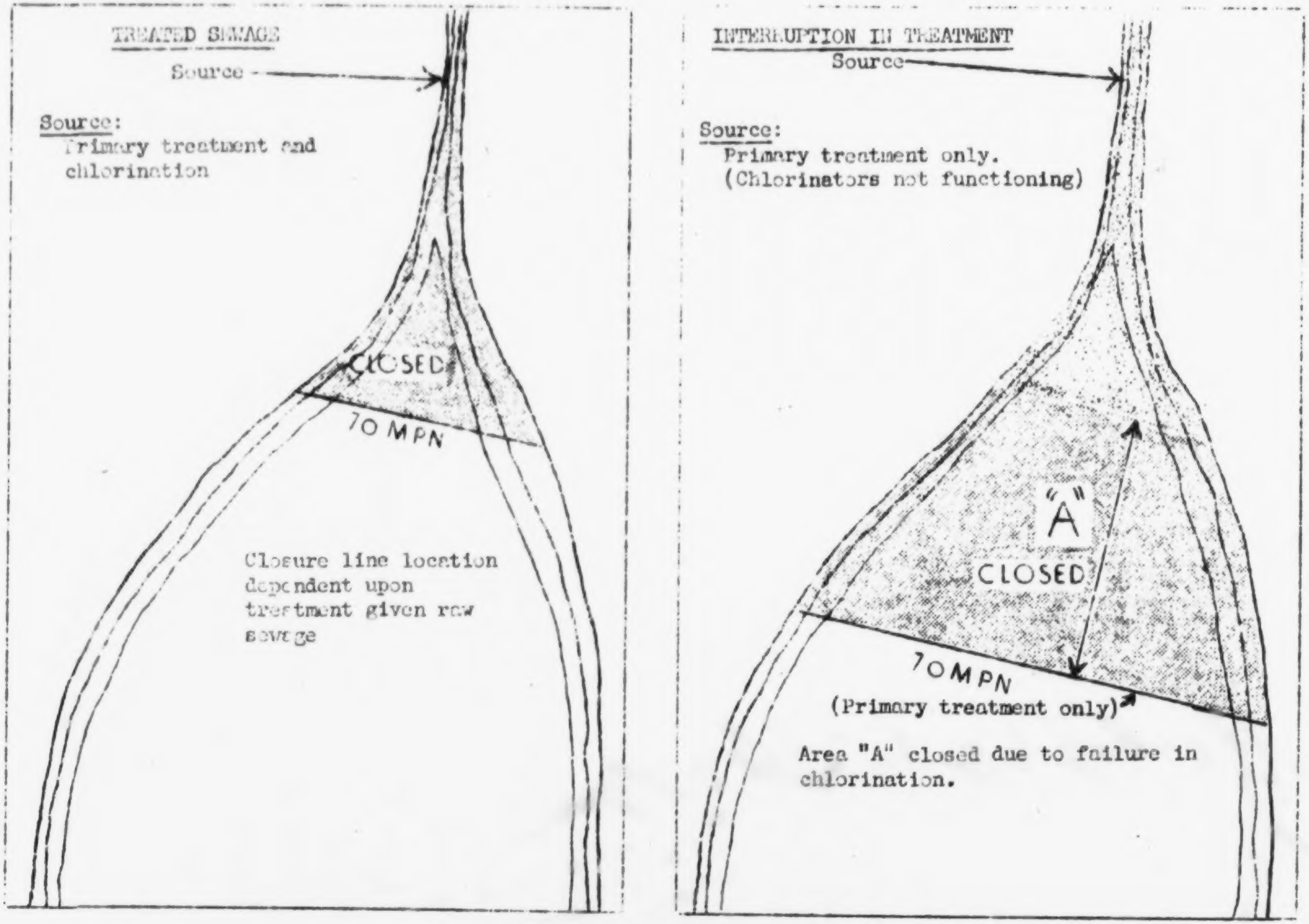
II TREATED SEWAGE DISCHARGES

The discharge of treated sewage into receiving waters, which will become shellfish growing waters, introduces an element of variability that has not generally been accounted for in present practice. Some possible causes of this variability will be suggested for consideration in reviewing the applicability of the present manual recommendations and practice. If the technical considerations presented in this section are considered correct and warrant possible action in terms of improvement in the cooperative shellfish sanitation practices, then the accompanying administrative questions contained in a following part will be applicable.

A. Interruptions in Treatment

Interruptions in the operation of the various phases of the sewage treatment process are quite frequent and by comparison to similar interruptions in water treatment process are often considered of little consequence. Perhaps in the case where the safety of a food product is concerned the interruptions in the sewage treatment process should be taken more seriously and provision be made to reduce, eliminate or compensate for them. The example given in Fig. II coupled with the following table from "Water Supply and Waste-Water Disposal" - Fair and Geyer, will provide some estimation of the possible problem introduced with each interruption in the sewage treatment process:

	Percentage Removal
Treatment operation or process	Bacteria
1. Fine screening	10-20
2. Chlorination of raw or settled sewage	90-95
3. Plain sedimentation	25-75
4. Chemical precipitation	40-80
5. Trickling filtration preceded and followed by plain sedimentation	90-95
6. Intermittent sand filtration	95-98


TREATED SEWAGE
Source
Source:
Primary treatment and
chlorination
CLOSED
70 MPN
Closure line location
dependent upon
treatment given raw
sewage
INTERRUPTION IN TREATMENT
Source
Source:
Primary treatment only.
(Chlorinators not functioning)
"A"
CLOSED
70 MPN
(Primary treatment only)
Area "A" closed due to failure in
chlorination.

INTERRUPTION IN TREATMENT EFFICIENCY
Fig. II

Treatment operation or process	Bacteria
7. Activated sludge treatment preceded and followed by plain sedimentation	90-98
8. Chlorination of biologically treated sewage	98-99

Treatment process interruptions which would result in deterioration of the sewage effluent of this order of magnitude would appear to require that in evaluating the added treatment efficiency of the receiving waters the continuity of operation of the sewage plant, at time sampling program is undertaken, should be given every consideration. Experience gained in the evaluation of State programs indicates that in many programs this relationship is not taken into consideration at time the bacteriological samples are taken from the growing areas.

It would also seem to be possible to relate the extent of closure required in the growing area to the corresponding level of partial treatment. This would require a rather complicated study in most cases which might routinely rule out the practice. In any event, the closed areas for no treatment and normal level of treatment efficiency should be known. Then the only question would be an administrative one of notification of change in growing area classification.

In summary, the variability resulting from interruptions in the sewage treatment process could be handled as follows:

1. Do not open any area because of decrease in pollutant load resulting from a treated sewage.

   Or

2. Open an area dependent upon the efficiency of the treatment process but with the provision that:

a. Interruptions in the treatment process would result in immediate classification to previous status.

Or

b. Interruptions in the treatment process would result in the immediate movement of the area classification boundaries in accordance with the reduced level of treatment. This would require that a study had been made to determine this area location.

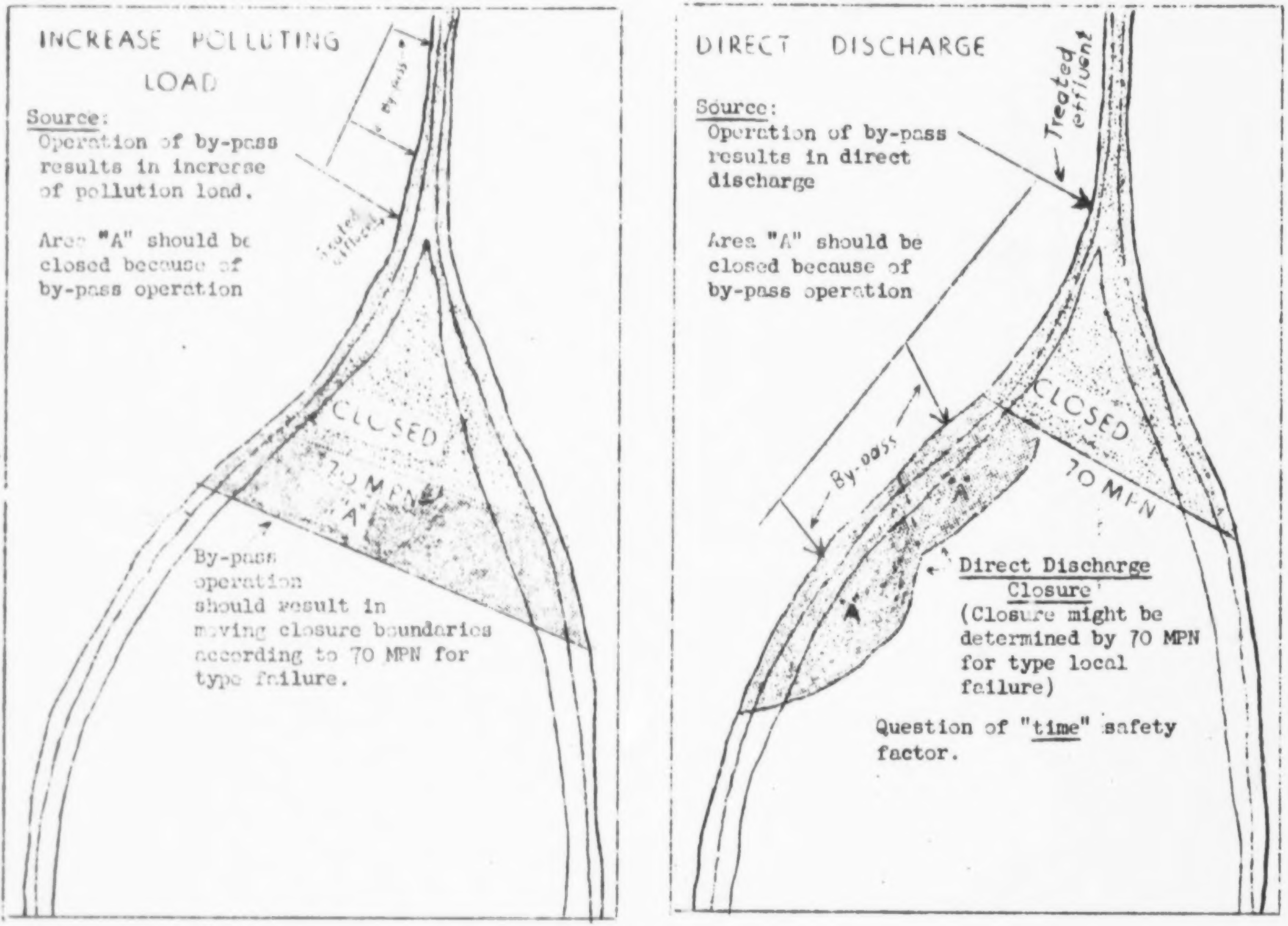
Some problems which might be encountered are those related to breakdown of chlorination where standby equipment is not available; automatic within plant by-pass which does not normally come to the immediate attention of the operator, controlled by-pass of a part of the treatment process because of repairs or operational difficulties such as sludge bulking, etc.

Perhaps the primary point to be made here is to realize that the treatment plant becomes the dominant factor in the classification of the growing area and its continuity of operation must be considered at time area is classified and while the area classified depends upon the presumed continuity of operations.

B. Pumping Station By-Pass - Sanitary Sewer System

As shown in Fig. III the by-passing of raw sewage might result in either a direct discharge of raw sewage to the growing area or else increase in the polluted load discharged into that part of the receiving waters which serve as a sewage treatment process.

The problem associated with their control would be related to manual and/or automatic method governing the by-pass operation. In other


INCREASE POLLUTING LOAD

Source:
Operation of by-pass results in increase of pollution load.

Area "A" should be closed because of by-pass operation

By-pass operation should result in moving closure boundaries according to 70 MPN for type failure.

DIRECT DISCHARGE

Source:
Operation of by-pass results in direct discharge

Area "A" should be closed because of by-pass operation

Direct Discharge Closure

(Closure might be determined by 70 MPN for type local failure)

Question of "time" safety factor.

By-pass
Treated effluent
CLOSED
70 MPN
"A"
Treated effluent
By-pass
CLOSED
70 MPN
A
A

PUMPING STATION BY-PASS

Fig. III

words, it is necessary to provide a means of notification so that either immediate corrections may be made or proper administrative notice given for closing and patrolling the affected shellfish growing area.

C. Sewer Outfall Location

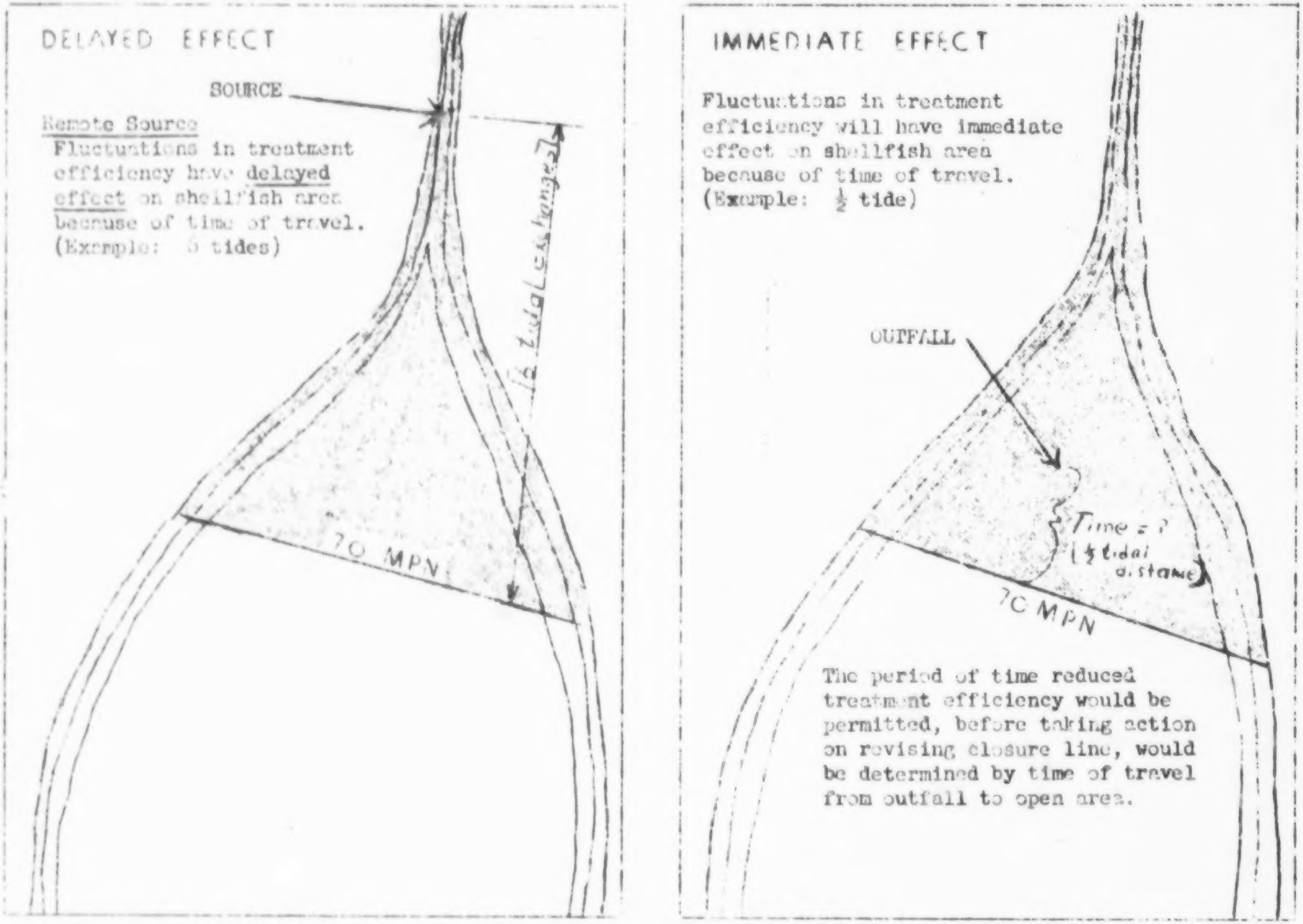
Present experience indicates that in the design of sewer outfalls the effect of the location upon the area of shellfish waters needed for treatment of remaining pollution load has been considered. But isn't there also the problem of time of flow from the outfall to the open areas? As indicated in the "Introduction" one state program has taken a very decided opinion on this matter in interpreting the recommendation contained in the present manual. The situation shown in Fig. IV and VI is indicative of one that the shellfish agencies in New Jersey and New York may be facing soon in connection with a proposed sewer outfall into Raritan Bay.

D. Combined Sewer System

The combined sewer system presents problems from two types of variability introducing factors depending upon whether the effect results from by-pass in the collection system or reduced treatment efficiency at the treatment plant.

By-Pass

The same problems, in regard to the point of discharge of the by-pass, as covered in the section on "Pumping Station By-Pass" are applicable to this consideration. In addition, there is the problem of frequency of functioning and ability to provide a system of notification. In most cases the latter difficulties will be such as to rule out the


DELAYED EFFECT
SOURCE
[6 tidal exchanges]
70 MPN
IMMEDIATE EFFECT
OUTFALL
Time = ?
(½ tidal distance)
70 MPN

Remote Source
Fluctuations in treatment efficiency have delayed effect on shellfish area because of time of travel. (Example: 6 tides)

Fluctuations in treatment efficiency will have immediate effect on shellfish area because of time of travel. (Example: ½ tide)

The period of time reduced treatment efficiency would be permitted, before taking action on revising closure line, would be determined by time of travel from outfall to open area.

SEWER OUTFALL LOCATION

Fig. IV

benefit received from ultimate point of discharge or treatment and no increase in open shellfish areas would result from the treatment of this part of the sewage load.

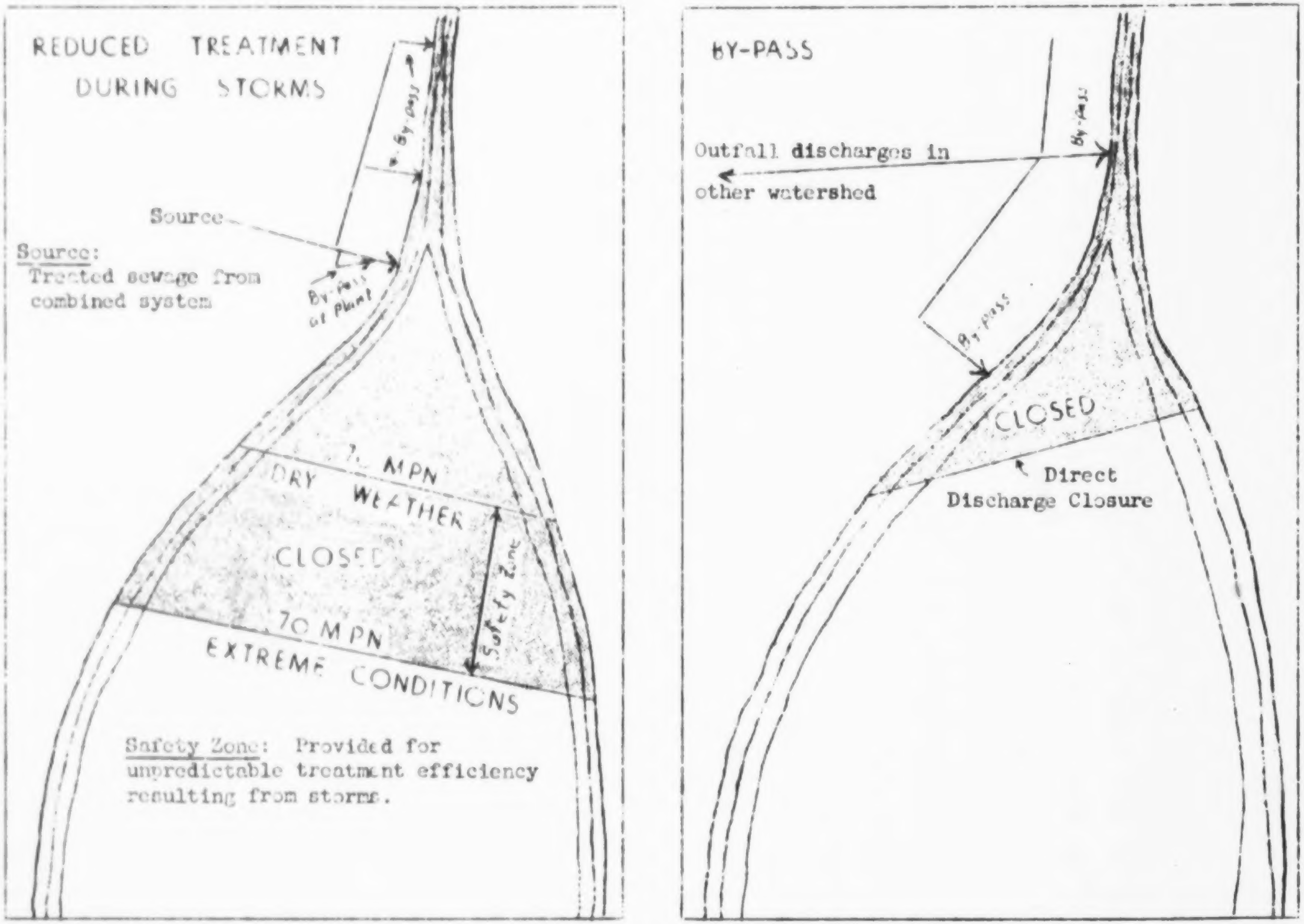
The most important factor to consider is the question of how their existence should be accounted for in the original classification of the area. Seldom are they considered in the execution of the bacteriological sampling program such that sampling is related to a time of their operation. Some states have recognized the problem and have added an extra safety zone not determined just by the 70 MPN values. This is shown in Fig. V.

Reduced Treatment Due To Overload

Although there are many possibilities or combination of circumstances which might compensate for the increased flow to the treatment plant during times of heavy storms flow it would seem reasonable to assume that such increase in flows would generally result in a reduction in the overall treatment efficiency as it relates to bacterial removal. Perhaps this would not create a problem of sufficient variability to warrant special consideration, but it would seem to indicate that in establishing the boundary of the open area on the basis of the bacteriological sampling program increased emphasis should be given to samples collected during such extreme conditions.

E. Natural Disasters

Natural disasters introduce the problem of variability because of the effect of the disaster agent upon one of the above enumerated situations. The swiftness with which the problem occurs and the wide spread area affected do indicate some possible administrative problems.


REDUCED TREATMENT DURING STORMS
By-pass
Source
By-pass at Plant
7. MPN
DRY WEATHER
CLOSED
Safety Zone
70 MPN
EXTREME CONDITIONS
BY-PASS
By-pass
By-pass
CLOSED

Source: Treated sewage from combined system

Safety Zone: Provided for unpredictable treatment efficiency resulting from storms.

Outfall discharges in other watershed

Direct Discharge Closure

COMBINED SEWERAGE SYSTEM

Fig. V

III. DISCHARGE TIME FACTOR

This is a question of how long the variation resulting from the increased pollution load may be permitted to exist before action should be taken to compensate for its existence. This becomes a factor when minor breakdowns in such equipment as chlorinators permit a couple hours flow at the reduced treatment efficiency. This question would also have a bearing upon sewer outfall location because it would appear reasonable to assume that short periods of discharge might be permitted where the growing area is several tidal exchanges away from the point of introduction of the pollutant. Such other factors as the exchange ratio or the proportion fresh to salt water would also have some bearing upon this problem because that serves as an indication of the dilution available.

No suggestions are made. It is hoped that some person who has had an opportunity to study this problem in the field would be able to provide a suggestion. If such information is lacking then this might be indicative of the need for a research investigation.

IV. ADMINISTRATIVE FACTORS

The administrative factors which are considered here are related to problems associated with the use of an area which is dependent upon a predetermined level of sewage treatment for its continued use.

A. Terminology

"Conditionally Approved Area" - An area whose suitability for shellfish harvesting for direct marketing is dependent upon the continued satisfactory functioning of sewerage systems. The term "satisfactory functioning' is understood to mean that the sewage effluent from the sewerage system will be at least as good as that for which the conditionally approved area is established.

There has been considerable discussion regarding the use of the term "conditionally approved" including some at the last National Shellfish Sanitation Conference. Some people have stated that in effect all areas are only conditionally approved so why single out the case of treated sewage discharges only. Some other possible descriptive terms are:

1. Approved Dependent Areas
2. Temporary Approved Areas
3. Approved Controlled Areas
4. Approved Special Areas
5. Approved Related Areas

etc.

Since agreement on the terminology appears to be among the least of the problems the term "conditionally approved area" is used in the remainder of this presentation.

B. Speed of Notification

How soon after the sewage discharge load becomes greater than that for which the area is established should the area be reclassified would depend in large measure on the "discharge time factor," referred to before, the tide phase and the administrative channels. All things taken into consideration, it would seem reasonable to expect that the final decision of this time period for notification should be established at the time the area is studied and classified. There would be the need for some guide lines to be used in the evaluation. Assuming a decision has been reached regarding the time then the first step required is the detection of the cause for increase in the pollution load in the discharge.

Detection

In many cases the total time available from detection to reclassification and revised patrol of the area may be as little as six hours. When the delays inherent in the administrative steps discussed below are considered this at the best allows very little time for detection.

Since the two main types of failure are that which occurs at the treatment plant itself and that which occurs in the sewerage system, primarily pumping stations, the problem is related to the ability to devise or use an automatic detection system or whether manually operated or human detection is needed. In most cases of by-pass operation an automatic warning device and automatic recorder may be provided. This also applies to within plant by-pass lines. The automatic recorder serves as an administrative control device. In the case of seldom used by-pass lines which are manually controlled an administrative check device utilizing a sealing method similar to that used on electric meters might be adopted.

Perhaps the greatest problem at the present would be the method of control over the chlorination. Since this is not a particularly difficult job to accomplish in a water plant it should not be any more so for a sewage plant. The primary difference is in the outlook of the operator and the provision of the necessary standby or emergency equipment. Check inspections, administrative operating reports and even a re-orientation of the operator might be required to establish the need for continuity in sewage treatment where a raw food product is dependent upon it.

Administrative

After the detection of the cause indicative of a need for changing the open area boundaries the next problem is to provide notification to the harvesters or potential harvesters. In general, the problem might be split into two parts depending upon the type of ownership of the particular growing area. In the case of private beds only a relatively few persons would have to be notified while in the case of public beds the number may only be limited by the number of lisenced "takers." In the case of private areas it might only be necessary to notify the owners and maintain normal patrol over the area by the patrol force. In the case of public beds an almost continuous patrol might have to be provided for the down-graded part of the conditionally approved area. To reduce this burden on the patrol force a suggestion has been made that special permits be issued for use of conditionally approved areas. In this latter case notification of the special permit holders and routine patrol operations would be sufficient.

Another big factor to consider in the notification procedure would be the manner in which the patrol force and potential "takers" using the area should be notified. One way would be to make an advance decision at time area is classified such that upon detection of the cause the "takers" and/or patrol force would be notified directly. Another possibility which becomes complicated in terms of weekends and holidays to say nothing of night calls is to provide notification through the normal administrative channels. This would require notification of shellfish sanitation control agency and then notification of patrol units and possible "takers." This latter method would provide for some latitude in the administrative interpretation of the particular breakdown in treatment efficiency.

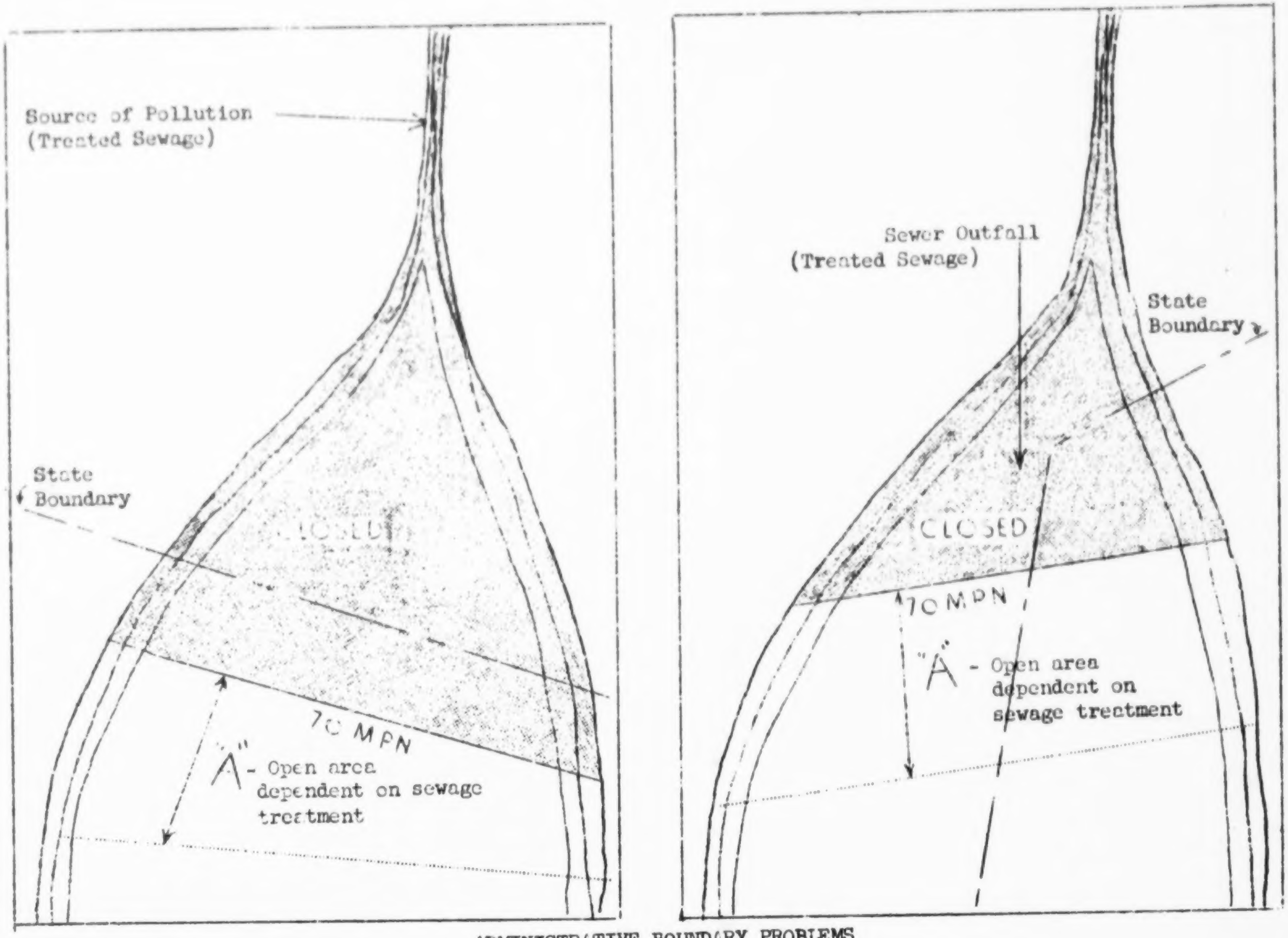
Closure Procedure

In establishing the legal right of the control agency to close shellfish areas the laws and regulations, in many cases, have been so written that the control agency is required to make an extensive series of tests, provide written notification to the newspapers, etc. before a closure may be made. Recently some states have been successful in obtaining permissible revisions to this practice so that they are now able to provide immediate closure, for cause, for a period of time sufficient to take the samples and make proper newspaper coverage etc.

This problem is also related to the manner of notification mentioned above. It is this interrelationship that has been the reason for suggesting that the areas be given the special title of "conditionally approved area" so that they might be considered closed except for time when certain conditions are being met.

Interstate

The case where the pollutant source is in one State and the affected area is in another really makes for a complicating situation. This is not only a problem in notification but in routine control over the operation of the particular treatment plant including such administrative reports as operating logs, etc. This calls for a good deal of uniformity of opinion and cooperation. Some possibilities that represent actual cases are shown in Fig. VI.


Source of Pollution
(Treated Sewage)
State
Boundary
CLOSED
70 MPN
"A" - Open area
dependent on sewage
treatment
Sewer Outfall
(Treated Sewage)
State
Boundary
CLOSED
70 MPN
"A" - Open area
dependent on
sewage treatment

ADMINISTRATIVE BOUNDARY PROBLEMS

Fig. VI

SUMMARY

The present practice of classification of growing areas is based on a uniform flow and is divided into two basic types closure depending upon whether a coliform standard may be used in evaluating the relative safety of the area or as in the case of a "direct" discharge upon an evaluation of the sanitary survey including hydrographic information.

The discharge of treated sewage effluents creates problems of a variable source which appear to require that some indication of generally agreed upon "guide lines" be adopted for use in the cooperative shellfish sanitation program. Associated with this variability is the notification procedures including, detection, administrative control and reclassification procedures and the difficulties created by State boundaries.

The problems to be considered by the National Shellfish Sanitation Workshop are:

1. Does the discharge of treated sewage create a problem which is not satisfactorily handled in present practice and in the "recommendations" governing the cooperative program?
2. What may the "Workshop" recommend in the way of agreed upon recommendations and what procedure should be used in completing the recommendations including the investigations upon which to base the necessary administrative decisions?

APPENDIX C

POLLUTION PROBLEMS CREATED BY WASTE FROM CABIN CRUISERS AND OTHER SHIPPING

by

HAROLD F. UDELL

One requirement contained in the Recommended Practice for Sanitary Control of the Shellfish Industry relates to handling of bodily excretions from boats engaged in the harvesting of shellfish. This requirement originally written to cover oyster dredge boats has in recent years been extended to cover boats harvesting clams. Thus, to comply with the requirement, all boats engaged in the harvesting of shellfish must be equipped with facilities for storing bodily waste while working over shellfish grounds.

The public health hazard, whether actual or potential, resulting from non-compliance to this requirement is, in many regions, insignificant in comparison to that created by pleasure boats. In the Marine District of the State of New York, there are approximately 120 vessels engaged in harvesting clams by hand, tonging, or hand raking. These craft operate throughout the year, weather permitting. There are about 30 oyster dredge boats engaged in dredging operations during the period September to April. The remainder of the year, these dredge boats are employed intermittently in connection with various phases of oyster culture. The area of water covered by these shellfishing operations amounts to 500 square miles. The depths involved vary from 5 to 35 feet. The salinities of these waters range between 17 to 31 parts per thousand. The average salinity of the shallow water embayments is 25 parts per thousand and that of the deeper estuaries and bays 28 parts per thousand. These characteristics are listed to indicate the magnitude of dilution available from both fresh and salt water.

In contrast to the number of boats engaged in the shellfishing activities, there are approximately 25,000 pleasure crafts plying the waters of the marine district. Of this number, approximately 19,000 boats cruise the waters from which shellfish are harvested. It is estimated that 80 per cent of these boats have some sort of cabin superstructure and are equipped with toilet facilities. These figures serve to illustrate rather dramatically the problem created by pleasure craft versus commercial fishing vessels.

It was felt that the activities of such a large number of boats might be a significant factor in the pollution of the waters over-lying shellfish grounds. In thinking of this situation, it becomes apparent that pollution from waste discharged into the estuaries and embayments from small craft would depend upon certain factors such as: a. quantities of waste discharge per unit area; b. dilution available; c. the circulation pattern of the estuary or embayment and; d. survival rates of pathogenic organisms in the specific receiving waters.

To carry out an investigation designed to determine the effects bodily waste discharged from small craft would have on the sanitary condition of estuaries, would require an appreciable expenditure which might not be justified. It was, therefore, decided to conduct such a study within a small harbor from which concentrations of small craft would be found for an extended period of time.

Such an area known as Eaton's Neck Harbor was chosen on the north side of Long Island for study during the summer of 1953. This harbor is well protected with a water area approximately 700 feet wide and 3,000 feet long. About one-half of its length is sheltered behind a sand spit which serves as the principle area for overnight anchorage of cabin cruisers. A concentration of boats of between 22 to 58 were present at the time of the study. It should also be noted that there is a daily 4 feet rise and fall of tide in this harbor.

The study of the effect of cabin cruiser waste on receiving waters was developed and carried out as a joint investigation by the New York State Conservation Department and the New York University sponsored by the Interstate Sanitation Commission. The New York University, College of Engineering Graduate School, collected the largest amount of material and prepared a final report covering the entire study.

From the results of this study, it was concluded that certain sampling stations associated with boat conjection showed higher levels of pollution than sampling stations outside the anchorage area. The inference is that specific boat activities at or near a sampling station affects the coliform density of water in the immediate area.

Normal changes in weather conditions did not appear to have any measurable affect on water pollution since boat activity continued throughout the anchorage period. Flushing action in the harbor had some influence on the waters but not as much as that caused by a severe storm. There did not appear to be a built up or a residual pollution within the harbor waters. Although minor increases were noted, it was felt that these were not due to cumulative effects. Throughout the study, refuge and other waste associated with toilet discharges were observed repeatedly in the harbor waters. Probably the most significant conclusion which could be drawn from this study was that the presence of fresh bodily excretions emanating from boats caused the surrounding waters to be unsafe for shellfishing and other recreational purposes.

The average small craft of 20 to 40 feet has little room for placement of more than the essential equipment. Therefore, facilities for treating waste involving extensive cubage or weight is prohibitive regardless of the results produced by such facilities. A study carried out under the sponsorship of the Interstate Sanitation Commission to aid in the development of devices to control pollution from cabin cruisers listed the following criteria for treatment:

1. The destruction of waste.
2. The elimination of floating solids.
3. Minimization of hazards to bathers.
4. Minimization to shellfish beds.
5. Minimization of space and weight requirements for treatment equipment.
6. Minimization of operation and maintenance requirements of treatment equipment.
7. Simplification of treatment controls so that craft occupants will, with a minimum of effort, place the treatment processes in operation whenever required.

This study was concerned with developing a method of laboratory treatment of bodily waste and the effectiveness of that method in reducing coliform density of toilet charges. Experimenting with ground toilet waste, it was determined that a dosage of chlorine in the order of 1500 milligram per charge of material gave effective reduction of coliforms when held in contact with chlorine for a period of twenty minutes. It was further demonstrated in the laboratory that bodily waste could be treated by grinding with chlorination to reduce coliform density and to obtain solids having good settling characteristics. Such waste discharged into receiving waters having the capacity to float a cabin cruiser should be dispersed and disposed of without serious hazard to health or without creation of aesthetic nuisances.

I feel these studies have been worthwhile in producing background material upon which a full scale study of the entire situation might be based. The development of suitable equipment for handling of this waste will probably depend upon the activity exercised by any regulatory authority for pollution abatement in estuaries and embayments.

Some success along these lines has been experienced in the Marine District, State of New York. through voluntary cooperation by operators of yacht basins and yacht owners. The Shellfisheries Management Unit, Division of Fish & Game, State of New York Conservation Department engaged in some preliminary public relations which it is hoped would lead towards more complete cooperation between all groups in eliminating the discharge of bodily waste at marinas and anchorage basins.

In brief, the plan which will be attempted this next season will be to request local authorities to provide toilet facilities at all municipal operated marinas and require that waste shall not be discharged from boats while at anchorage.

The same conditions will be required at private marinas and yacht basins. Due to the necessity for obtaining an operating license, it is believed little difficulty will be experienced in enforcement of the requirements.

This still leaves us with a problem of what to do with the thousands of small craft utilizing our many square miles of estuaries ane bays. It is anticipated that funds will be made available to the New York State Conservation Department, Shellfisheries Management Unit, through research grants to carry out a complete study to determine the actual effect such craft have on the sanitary quality of marine waters.

APPENDIX D

BACTERIOLOGICAL EXAMINATION AS AN INDICATOR OF SANITARY QUALITY OF MARKET SHELLFISH

by

C. B. KELLY

Since the inauguration of the Shellfish Sanitation Laboratory in 1948 the program of activities has been directed toward the collection of facts directly pertinent to a reasonable bacterial evaluation of the sanitary quality of shellfish. The studies were designed and conducted with a realization of the need for information on the basic factors involved in the influence of pollution on shellfish in their aquatic environment and the bacterial changes occurring during accepted practices of harvesting, processing and marketing.

At Woods Hole the laboratory was interested in the three commercially important species of shellfish in that area; the oyster, the hard clam, or quahaug, and the soft clam. Of chief concern and probably of most significance to a discussion on bacteriological standards were the studies on the relative coliform content of shellfish and overlying water. The three species of shellfish were simultaneously subjected to continuous flow of artificially polluted water in laboratory aquaria and the course of pollution and the relative accumulation of coliforms by the shellfish were determined by periodic examination of the shellfish and water. The relative coliform level attained by the three species at three temperature ranges is presented in Table I. The number of repetitions of these experiments was sufficient to allow an extensive statistical analysis by Dr. E. K. Harris, Analytical Statistician for the Sanitary Engineering Center. The results suggest the following general conclusions:

1. The rate of accumulation of coliform organisms by quahaugs and oysters is influenced greatly by temperature. Both the relative coliform density and its rate of increase with increasing water pollution were found to be considerably greater at temperatures above 8°C than at lower temperatures.

2. In soft clams the influence of temperature on the rate of accumulation of bacteria did not follow the same pattern. Clams were found to accumulate coliforms to almost the same degree at temperatures between 0° and 8°C as at temperatures between 8° and 17°C. However, at higher temperatures - 20° to 23°C - reduction in the rate of accumulation occurred.

3. The relative rate of accumulation by quahaugs and oysters and at cold and moderate temperatures is quite similar, but the rate in soft clams was significantly greater than in either quahaugs or oysters. Maximum accumulation by all species occurred in the moderate temperature ranges. The soft clams showed a lower rate at the higher temperature and the quahaugs and oysters at low temperature.

Also pertinent to a discussion on bacteriological standards is the question of the relative survival of indicator organisms and specific pathogens in water and in shellfish after removal from the water. Laboratory experiments conducted at Woods Hole on stored sea water indicated a marked similarity in the survival of a selected coliform, E. coli and a specific pathogen, Salmonella schottmuelleri. Initial concentrations of the indicator and test organisms were in the order of 10,000 and 1000 MPN per 100 ml respectively. Salmonella organisms survived for 13 days at storage temperatures of 2.5° to 6.5°C, for approximately 7 days at temperatures between 7.5° and 11°C, and 2 days at temperatures of 21° to 23.5°C.

In shellfish polluted with these same organisms and submitted to dry storage, a marked similarity in the survival of both organisms was observed. Salmonella were found to persist for 49 days with little reduction in oysters stored at approximately 5°C. In soft clams salmonella persisted with little reduction throughout their entire storage life of 14 days.

In June 1953, the Shellfish Sanitation Laboratory transferred activities to the Gulf Coast area. Three main investigations have been conducted in this area. The first involved the comparative survival of coliform and salmonella organisms in saline waters. This series was conducted throughout more than a calendar year to encompass possible variations due to season and water temperatures. These studies again indicate a marked similarity in die-off curves of the indicator and test organisms.

In another series of experiments, the water-oyster coliform relationships were determined at three pollution levels and under various climatic conditions. These experiments were similar to those conducted at Woods Hole with the exception that oysters only were used as test animals.

Since Dr. Harris will use the results of these shellfish studies to exemplify a system of evaluating and interpreting such data, a detailed accounting of the results will not be given here. Dr. Harris will bring out the point that in the Pensacola studies a higher water-shellfish coliform ratio was observed. The influence of seasonal variations was not as marked as they were in the Woods Hole studies.

Laboratory scale experiments were necessary to the determination of some of the fundamental factors involved in the relationship of shellfish to their aquatic environment. Realizing, however, the limitations of laboratory experiments, the Shellfish Sanitation Laboratory has participated in a number of cooperative studies in growing areas and in oyster plants. The investigations were designed to trace the bacterial changes and relationships in actual commercial conditions of harvesting, processing and marketing.

The first of these, undertaken while the laboratory was at Woods Hole, was conducted in cooperation with two states on the middle Atlantic seaboard. It was designed to determine the changes taking place in handling of oysters in representative shucking houses and included the examination of shell and shucked oysters collected at strategic points in the chain of handling, shucking, packing and marketing. Pilot and commercial shipments of the shucked oysters to the marketing areas were tested. Results of this study are shown in Table II. The groupings used include many of the figures mentioned or in use by control agencies as limiting values for shell or shucked oysters. You will see the MPN's of 230 and 2400 mentioned in the Manual of Recommended Practice for Sanitary Control of the Shellfish Industry. Also included are the values used in the classification of market shucked oysters adopted by the Interdepartmental Shellfish Committee of Canada at their meeting in 1950.

It will be seen that the greatest increase took place during the shucking operation. In this series of samples 60% of the shell stock samples examined aseptically prior to shucking showed coliform MPN's less than 230 and 82% less than 2400. None of the samples of these same lots after commercial shucking showed MPN's less than 230 and only 28% were 2400 or less. An approximate ten-fold increase in coliform MPN's occurred during shucking; 82% of the shell stock showed 2400 or less and 86% of the "as shucked" samples 24,000 or less. Although the washing and blowing operations in the packing room accomplished a reduction in coliforms, the final product did not return to the same coliform level as that of the shell stock before shucking. As packed into final cans; 15% were MPN less than 230, but 45% showed MPN's in excess of 2400 as compared to 18% of the shell stock samples. Of 42 samples taken from pilot shipments made to the Woods Hole laboratory, 43% showed coliform MPN's 2400 or less and 36% showed coliform MPN's in excess of 24,000.

The Standard Plate Count has been mentioned as a useful index of general sanitation. The groupings used in the classification of these results again include values suggested as operating standards. They include those recommended by the Canadian Department of National Health and Welfare in classification of samples of shucked oysters received in the Canadian market. The pattern of changes is very similar to that described by the coliform results. The increase between the "shell" and "as shucked" samples is practically of the same order as the increase in coliform organisms. The same degree of recovery in the "as packed" will be noted as well as the increase at Woods Hole or to the market.

In Table III are presented the results obtained by one of the Gulf Coast states from bacterial examination of shell and shucked oysters collected during the course of routine inspections of shellfish shucking houses. The data represents a series of approximately 90 samplings made during the period March 1950 through April 1956. In these data the shell stock immediately before shucking is considerably higher than in the preceding study. Of the oysters "as packed", 28% showed MPN's 2400 or less and 64% showed MPN's 24,000 or less. As you will see in the discussions that follow on studies conducted by this laboratory in a similar area, examination of traced lots of oysters from harvesting to the time of shucking has suggested a possible cause of these high coliform values. An increase in shucking will be seen from both the colirom and the plate count data although not as marked as in the previous study.

In an attempt to correlate the Pensacola laboratory findings with observations under field conditions in a completely natural environment, a series of studies has been started in the vicinity of Pensacola. Included in this study were the examinations of carefully traced lots of oysters throughout harvesting, shucking and packing. These investigations were started in the spring of the last oyster season; therefore they represent only those conditions prevailing during the warmer months. The results are presented in Table IV. The area from which these shellfish were taken is unquestionably of good sanitary quality. The median coliform MPN of 50 water samples taken in this area is 7.8 and the maximum 49. The high quality of the water is also reflected in the coliform content of the oysters as dug. Of the 30 samples of oysters taken as dug; 63% showed MPN's of less than 230 and 90% were less than 2400. These same oysters as brought to the dock did not change materially in coliform content, but after storage on the shucking bench for 12 hours, a striking increase will be noted. The coliform content of oysters taken at 12 hours was about 30 to 50 times that of the same oysters before storage. Only 15% showed MPN's less than 2400 and 50% showed MPN's in excess of 24,000. On passage through the processes of shucking and packing the increases due to handling can be seen. The final product after washing shows a coliform content approximately the same as that of the shell stock before shucking. In this case approximately 80% showed MPN's of 24,000 or less and 5% showed 2400 or less.

SUMMARY

Investigations have been conducted by the Shellfish Sanitation Laboratory in two widely different environments and climatic conditions. The data gathered during the course of these investigations that might be pertinent to a discussion of bacteriological standards for market shellfish may be summarized as follows:

1. The laboratory investigations on the relative accumulation of coliform organisms by the three commercially important species of shellfish in the Northeast section of the country have revealed definite species differences as well as differences due to water temperature. Soft clams almost always show a far higher coliform concentration than the hard clams or the oysters. This is particularly marked at cold temperatures when oysters and hard clams reduce in activity.

2. Laboratory scale experiments on the relative survival of coliform and salmonella organisms in stored sea water have shown a marked similarity in the rate of survival of both test and indicator organisms. The rate of survival, however, decreases as the temperature rises.

Salmonella have been demonstrated to survive in stored shellfish for at least as long as the shellfish might be in transit from harvesting to consumption.

3. Field investigations to determine bacterial changes during harvesting, packing and marketing of oysters have been conducted. The results indicate, that under current practices of shucking and packing, the coliform MPN level of 230 mentioned in the Manual is far from being satisfied.

TABLE I

ESTIMATED AVERAGE SHELLFISH COLIFORM MPN'S, BY SPECIES AND WATER TEMPERATURE, FOR VARIOUS APPLIED WATER MPN'S

Water Temperature	Shellfish	Average MPN Shellfish at Mean Water MPN of				
		20	70	230	700	1600
Low Less than 8°C	Soft Clams	380	930	2300	4800	6200
	Hard Clams	76	170	370	710	890
	Oysters	26	64	160	340	450
Moderate 8° - 17°C	Soft Clams	350	980	2800	6500	8700
	Hard Clams	120	320	840	1900	2500
	Oysters	130	450	1600	4700	6800
Warm 20° - 23° C	Soft Clams	375	833	1900	3600	4500
	Hard Clams	84	220	560	1200	1600
	Oysters	37	190	960	3600	5800

TABLE 11

COLIFORM MPN'S AND STANDARD PLATE COUNTS OF OYSTERS SAMPLED DURING PROCESSING

AREA A

	Percent of Samples in Stated Group or Less					
COLIFORM MPN	Shell	As Shucked	First Skimmer	As Packed	Woods Hole	Market
Less than 230	60	0	7	15	10	0
231- 2400	82	28	51	55	43	46
2401 -24,000	100	86	91	100	64	75
24,001 - <160,000	-	98	98	-	78	92
160,00 or more	-	100	100	-	100	100
No. of Samples	45	43	43	42	42	35
STANDARD PLATE COUNT						
1 - 1500	50	12	7	14	43	11
1600-10,000	82	62	63	74	62	65
11,000 - 50,000	98	100	100	95	89	79
51,000 - <1,000,000	100	-	-	100	95	100
1,000,000 or more	-	-	-	-	100	-
No. of Samples	44	42	43	43	42	35

TABLE III

COLIFORM MPN'S AND STANDARD PLATE COUNTS OF OYSTERS SAMPLED DURING PROCESSING

AREA B

	Percent of Samples in Stated Group or less			
	Shell	As Shucked	First Skimmer	As Packed
COLIFORM MPN				
Less than 230	6	6	2	2
231 - 2400	34	37	25	28
2401 - 16,000	76	74	68	64
More than 16,000	100	100	100	100
No. of Samples	78	89	88	89
STANDARD PLATE COUNT				
1 - 1500	3	0	2	2
1600 - 10,000	31	25	17	14
11,000 - 50,000	57	54	37	36
51,000 - <1,000,000	100	100	100	100
No. of Samples	65	65	65	66

TABLE IV

COLIFORM MPN'S AND STANDARD PLATE COUNTS OF OYSTERS SAMPLED DURING HARVESTING AND PROCESSING

AREA C

	Percent of Samples in Stated Group or less					
	Shell Oysters			Shucked Oysters		
	Dug	0 Hr.	12 Hr.	As Shucked	Pots	As Packed
COLIFORM MPN						
Less than 230	63	45	5	5	0	0
231 - 2400	90	81	15	5	5	5
2401 - 24,000	97	100	50	47	31	79
24,001 -<160,000	100	-	85	79	47	95
160,000 or more	-	-	100	100	100	100
No. of Samples	30	11	20	19	19	19
STANDARD PLATE COUNT						
1 - 1500	29	0	5	0	0	5
1600 - 10,000	79	82	15	5	5	10
11,000 - 50,000	90	100	30	20	10	52
51,000 - < 1,000,000	100	-	100	90	100	100
1,000,000 or more	-	-	-	100	-	-
No. of Samples	28	11	20	20	19	19

APPENDIX E

STATISTICAL ANALYSIS OF DATA FROM SHELLFISH SANITATION LABORATORY, WOODS HOLE, MASSACHUSETTS, AND PENSACOLA, FLORIDA

by

EUGENE K. HARRIS

I would like to discuss briefly some statistics which may help in solving this problem of bacteriological standards for the sanitary quality of shellfish and of the waters in which they grow. I shall restrict myself to an analysis of Mr. Kelly's results at Woods Hole, Massachusetts, and Pensacola, Florida, as they relate bacterial quality of growing oysters to that of the overlying water.

In setting standards for water and shellfish sanitary quality, we are faced with the practical necessity of determining a pair of water and shellfish coliform densities which will be compatible with each other. It is from this point of view that Mr. Kelly's data have been analyzed statistically. Thus, if we decide on an MPN of 70 or less as defining approved growing waters, what information can we obtain from Mr. Kelly's studies on the changes that oysters, for example, drawn from such areas will yield MPNs greater than some specified value, e.g., 230? We keep in mind, of course, that these studies were done in laboratory flats and are not entirely representative of open water conditions.

Because of difficulties experienced at Woods Hole, it was not possible to control either the water or oyster coliform density within a narrowly restricted range. Therefore, in analyzing these data it was necessary to relate each successive shellfish observation during a run with the average of several prior water observations. The result was a series of scatter diagrams, one for each temperature condition:

(diagrams of oysters at cold, moderate, and warm temps.)

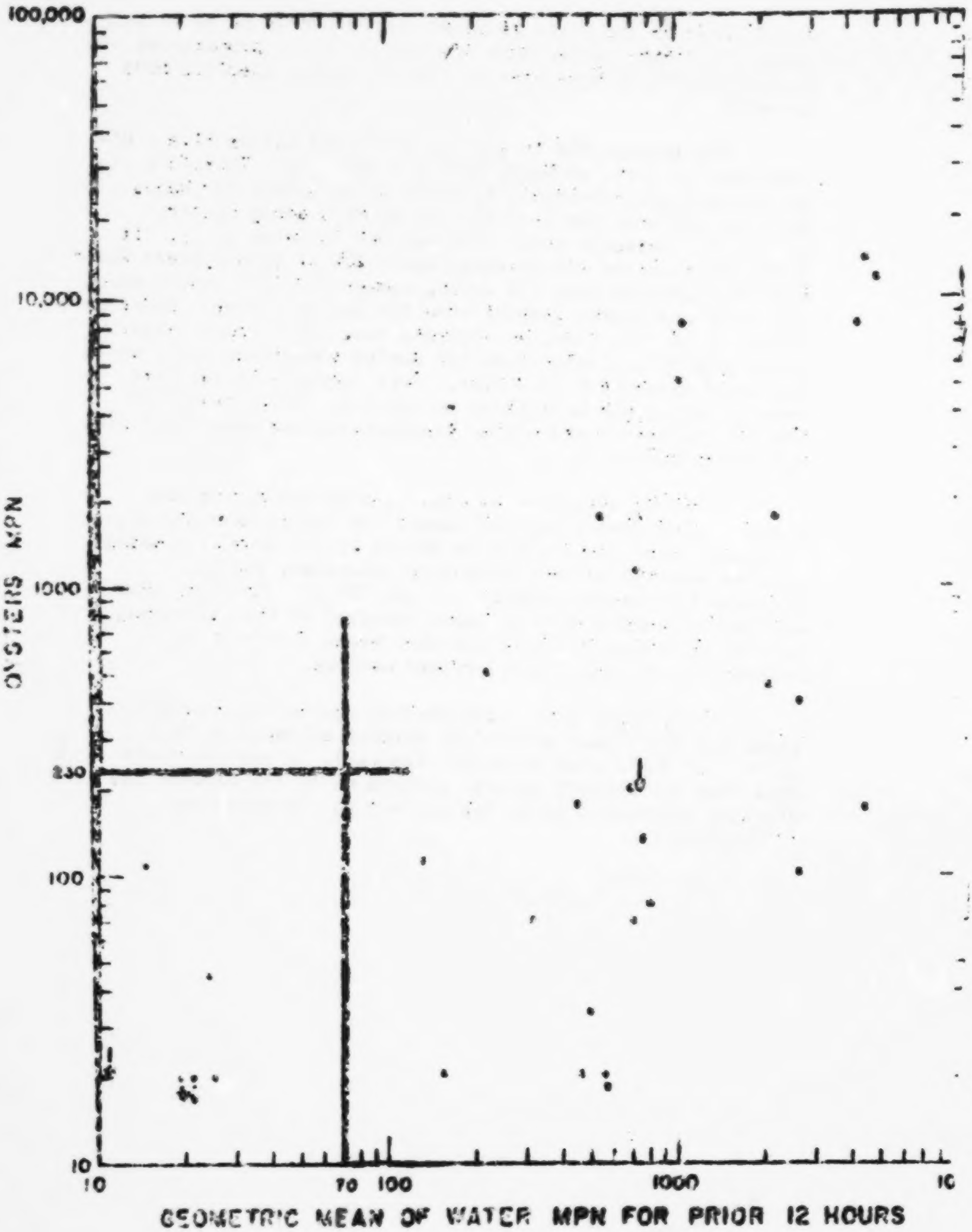
For these data secured at Woods Hole, we can quickly estimate the proportion of oysters showing MPNs greater than 230 from water with MPNs up to 70. This is done merely by drawing appropriate vertical and horizontal lines, counting the points in the upper left-hand block, and relating this number to the total number of points to the left of the vertical line. At low temperatures, this estimated change is 0/6, or zero, at moderate temperatures, 2/9, or 18%, and at high temperatures, 5/20, or 25%. As expected, these percentages increase with temperature. It should be recognized that the total number of points in any of these cases is not large.

In the Pensacola studies, coliform densities in both water and oysters were in much better control than at Woods Hole. As a result, these data do not present scatter diagrams but rather points clustered around two vertical lines which represent two average water coliform densities. We do not look at the whole range of possible MPNs up to 70 in water. Instead, we estimate statistically the proportions of oysters attaining MPNs greater than 230 under specific MPNs in water.

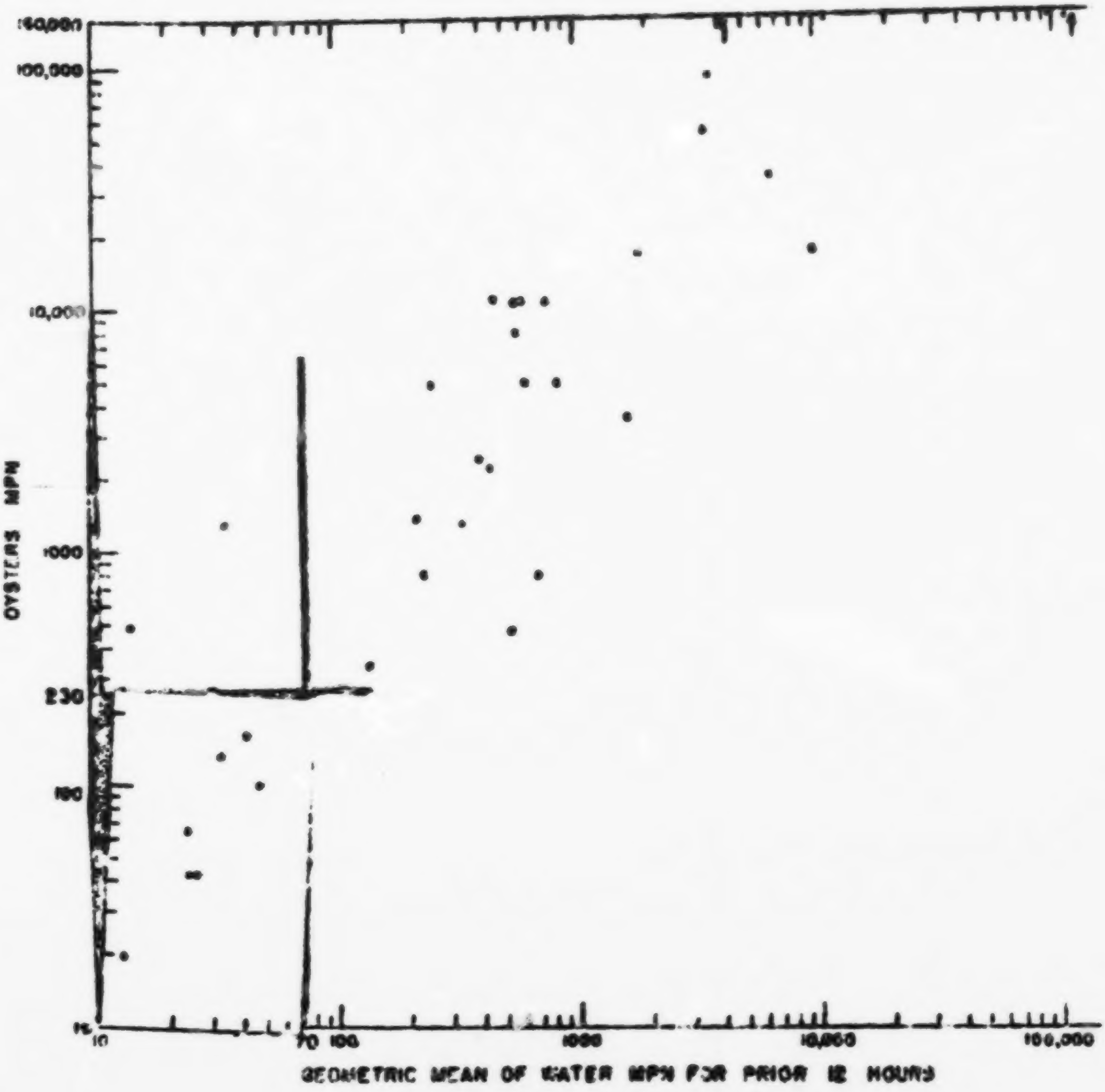
The average MPN in the low pollution waters (i.e., MPN less than 70) used at Woods Hole was about 25. Therefore, to get percentages comparable to those given before for Woods Hole, we estimate the distribution of MPNs among oysters studied at Pensacola under a median MPN in water of 25. It turns out that, on the average, about 20% of such oysters would show MPNs greater than 230 during summer and fall, while about 60% would yield MPNs greater than 230 during winter. Under an MPN of 70 in the water, we estimate that 75% of such oysters would show MPNs greater than 230 during summer and fall, while 90% would exceed 230 in winter. This increase in coliform density during winter puzzled me until Mr. Kelly explained that on the Gulf Coast winter temperatures are most favorable for oyster activity.

Focusing attention on results obtained during the winter season (the principal season for oyster harvesting), it appears that under a median MPN up to 70/100 ml. in water, oysters observed at the Woods Hole laboratory seldom exceeded the present standard of 230/100 ml. However, when applied to oysters such as those observed in the laboratory studies at Pensacola, this standard seems likely to be exceeded by the majority of oyster samples.

It is hoped that field studies now being undertaken along the Gulf Coast will offer further evidence on this point. It would also be highly desirable to analyze field data from New England waters, perhaps using the Raritan Bay clamming study as a guide for collecting the essential information.

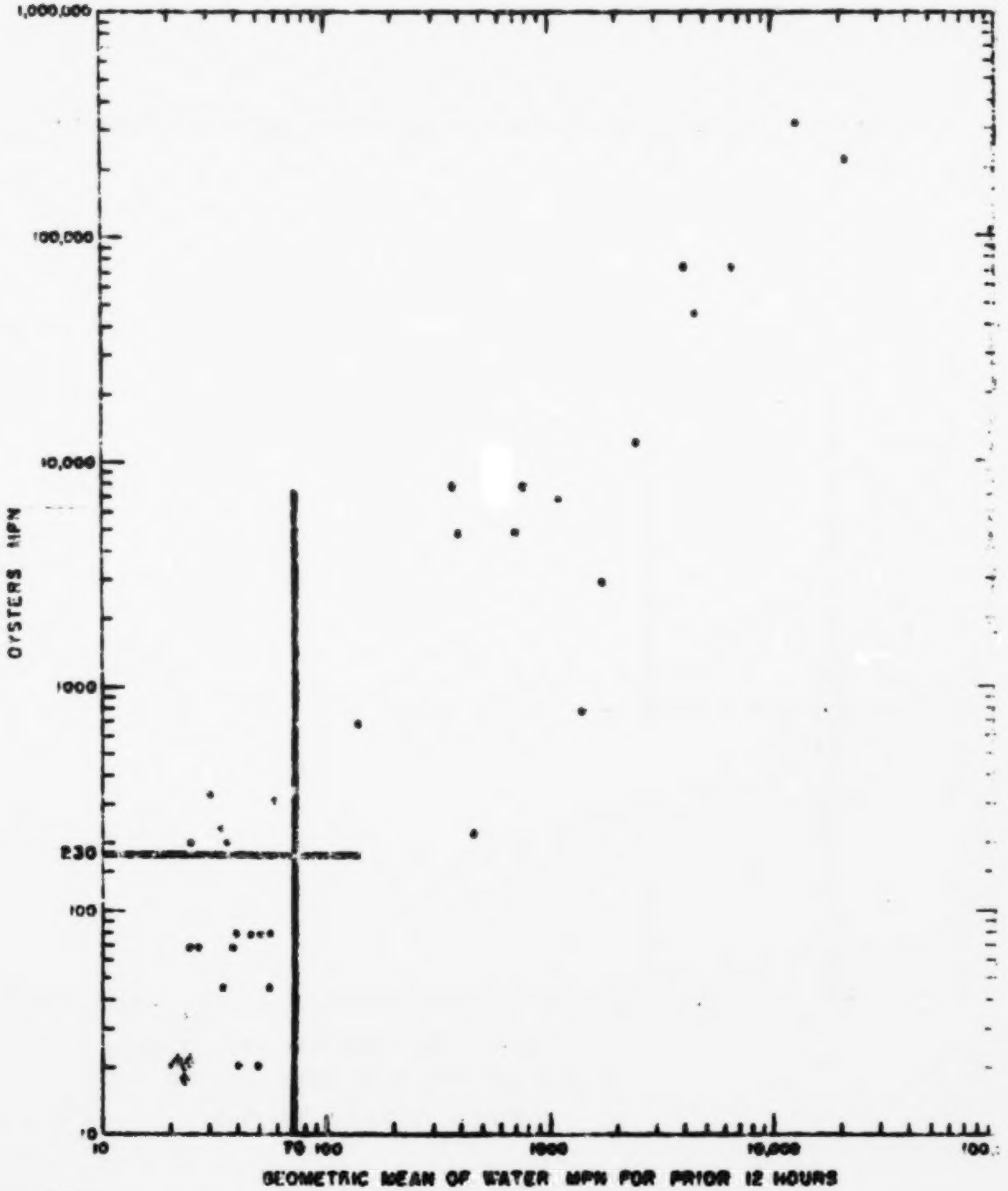


LOW TEMPERATURES <8° C.
WOODS HOLE, MASS.



MODERATE TEMPERATURES 8°-17°C

WOODS HOLE, MASS.



HIGH TEMPERATURES 20°-23°C.

WOODS HOLE, MASS.

APPENDIX F

BACTERIOLOGICAL EXAMINATIONS BY THE NEW YORK CITY DEPARTMENT OF HEALTH AS AN INDICATOR OF THE SANITARY QUALITY OF MARKET SHELLFISH

Prepared for National Shellfish Sanitation Workshop
August 27--28, 1956
Washington, D. C.

Edwin Ludewig
August 1956

The principal objective of the Division of Fish and Shellfish Inspection of the New York City Department of Health is aimed at the control of shellfish products sold in the city's markets. Approximately 10,000,000 lbs. of oysters, clams and mussels in the shell or in shucked form are shipped into New York City annually, a considerable part of which is consumed raw or incompletely cooked. This shellfish is received from approximately 1,000 shippers who are located in 10 Atlantic Coast States and Canada. This Department relies on the integrity of regulatory officials in the producing States and the United States Public Health Service for information concerning the origin of the shellfish and follows a policy of cooperation with the States and the Public Health Service.

There are periods however, when State and Public Health Service control programs are limited by personnel or budgetary difficulties so that maximum sanitary supervision over the industry is not always possible. Hence it was deemed advisable to set up bacteriological standards in the Sanitary Code for shellfish received in this City. We carry on a sizable sampling program to provide information regarding the bacterial quality of shellfish from all sources of supply. It is intended to include all shippers and shucking plants that market their products in this city. Their shipments are sampled a specified number of times throughout the year depending on frequency of shipments made and the amounts shipped in. The magnitude of this task is such that sampling activities are necessarily on a spot-check basis.

Bacteriological examinations as an indicator of the sanitary quality of market shellfish has been in effect in New York City since 1915. In that year, a bacterial standard was enacted into the Sanitary

Code for oysters offered for sale in the city and was based on the official scoring method of the Bureau of Chemistry of the United States Department of Agriculture. In 1920, clams and mussels were included with oysters in the Sanitary Code definition of shellfish. The bacterial standard was amended to declare that shellfish with a total score for B. coli equalling 50 or more by the American Public Health Association method shall be deemed contaminated. Provision was made for exclusion of a shipper from further shipments to New York City of shellfish from a particular source of supply if 3 successive samples from the same source were reported with scores of 50 or more. The bacterial standard applied administratively for evaluating shellfish at the present time is a coliform M.P.N. of 2,400 or more per 100 ml.

The Exclusion provisions in the Sanitary Code are enforced but are administered with a flexible policy. Drastic action is taken only when high coliform counts persist from a particular source of supply or shucking plant. If improvement over a shipper's or shucker's previous samples is indicated, exclusion is withheld even though the standard is not met.

Periodic sampling of shellfish from the various shippers is carried on at the time of arrival in this city. High-coliform samples are followed up with warning letters to the shippers indicating that the shellfish may have been taken from questionable areas or may have become contaminated after removal from the water. The warnings also urge the shipper to make an effort to prevent a recurrence as additional samples will be taken. Copies of the sample reports are always sent to the State agency concerned and to the Public Health Service. A reasonable time is always allowed before the next sample is collected to enable the shipper to take corrective measures or to apply to his State agency for aid.

In the majority of exclusion actions, samples from more than one season are involved. Not infrequently, shippers discontinue shipments to this city voluntarily when they are notified of high-coliform content in their samples. Such shippers may halt shipments to New York City for extended periods of time or permanently, or change the source of supply to one that produces low counts, or effect sanitary improvement in methods of handling, processing, packing or shipping. Our standard serves as a yardstick by which a shipper is warned that greater care must be taken and his shellfish improve in bacterial quality or suffer the loss of this city's lucrative market. It has been our experience that many instances of high bacterial counts have been due to faulty or insanitary equipment or shipping containers or poor processing, handling and transportation.

Sampling of shipments on arrival and routine inspections of tags has a salutary effect and keeps out shellfish of uncertified or doubtful origin. It serves to discourage illegal or irresponsible shippers who turn to other localities where there is less regulatory control. It helps to prevent New York City from being a dumping ground for old stock held for days by shippers who have been unable to sell their shellfish at nearby markets or who have accumulated surpluses hoping for a scarce market or higher prices.

It is our feeling that bacteriological examinations in a large marketing area play an important part in the over-all program of improving the sanitary quality of shellfish shipped in. It provides some indication to the State of the quality of the shellfish produced therein. It also furnishes an excellent weapon to the State regulatory agencies to effect a more sanitary operation in the plants under their jurisdiction. We believe our program supplements the control programs of the producing States and the Public Health Service and helps to relieve some of the burden of adequate control at the source.

APPENDIX G

BACTERIOLOGICAL EXAMINATION OF SHELLFISH AS AN INDICATOR OF MARKET QUALITY

by

C. S. BRINSFIELD

I appreciate the opportunity to discuss with you the problem of the Bacteriological Examination of Shellfish as an Indicator of Market Quality. Any criticism I may may concerning the present 230-2400 MPN standards of the U. S. P. H. S. is done so from a constructive viewpoint.

This meeting was called to improve on our existing standards and this can only be accomplished by a frank discussion of factual information and the problems arising due to our existing standards. During my discussion on the high coliform counts of oysters, unless stated to the contrary, the results will be based on oysters from oyster growing waters with a median of 70 MPN per 100 ml or less.

It is practically impossible whenever the oyster growing waters in Maryland and Virginia are above 60° F to obtain shucked oysters that will average less than 2400 MPN per 100 ml. Our problem is not only caused by the temperature of the oyster growing waters, which in turn affects the temperature of the oysters when tonged, but the air temperature plus the fact that the sun's rays will further increase the temperature of the oysters. Thus we have a multiplication of bacteria in the oysters until such time as they reach 50°F. (1) H. D. Pease also found that oysters exposed to sun on the decks of boats usually developed high scores.

It is not unusual for some oysters to be in the sun on tonging boats for at least four hours. Then if the oysters are purchased by a "buy" boat, it is possible some may be subjected to at least four hours more of sunshine before they arrive at the plant for shucking. Although the shellstock bins in the plants afford good protection from the outside air temperature, it takes several hours for the oysters to cool down to the air temperature of the bin. I admit the hours mentioned in the sun is not the general practice, and only the top layers of the pile of oysters are affected, yet it does happen at times.

Hundreds of examinations have revealed that high MPN's are usually due to the presence in oysters of aerobacter cloace, a member of the coliform group, and we find that when there is little or no fecal pollution there is little or no Escherichia Coli present. (2) For example, in the case of high scores in oysters from the Chester River, Maryland, no Escherichia Coli could be found as the locations from which oysters were taken were far from any sources of fecal pollution. During September and October High scores are frequently obtained on oysters from shucking houses that maintain satisfactory sanitary practices in their plants. If the types of coliform bacteria are determined, they are often found to be mostly Aerobacter cloace.

Although the two above mentioned months show the highest coliform counts, a ten year study (1925-35) from twenty different oyster growing areas in the Chesapeake Bay by the Maryland State Department of Health of oysters and oyster waters (oyster samples 4,152, oyster water samples 12,689) show oysters occasionally having more than 2400 MPN per 100 ml throughout the oyster season.(3) However, in these studies there was a lack of any significance which could be attached to individual oyster MPN's as indicators of pollution.

(4)During the 1950-51 and 1951-52 seasons the U. S. Public Health Service conducted studies that showed 19 of the 42 samples when packed had coliform MPN's of 2,401-24,000, while at the market level we find 10 of the 19 still showing an MPN of 2,401-24,000, 6 having an MPN of 24,001-160,000 and 3 with an MPN of over 160,000. In what we term the legal category of 230-2,400 MPN at packing level, we find 17 samples. At the market end, 16 of the 17 samples were still in the 230-2,400 MPN class. Tabulating these results shows that of the 36 samples with MPN's ranging from 230-24,000 when packed, 26 of them still showed the same MPN ranges at the market level as when packed, while 10 showed increases. Therefore, you can conclude that one of the things learned as a result of this study is many oysters do increase in MPN's between the plant and market even though the conditions of refrigeration and transportation to market for this study could be considered as optimum whereas normal shipments in many cases do not reach this high a level.

I will not bore you with further figures, but will only say that many samples of oysters shipped into Maryland from Virginia plants and oysters from Maryland to other states show the same trend. Therefore, I contend the present MPN's of 230-2,400 are unrealistic for oysters taken from Virginia and Maryland waters and should be modified or abandoned.

In my opinion, if the 230-2,400 MPN does not represent the range of good quality in oysters, then these same coliform standards are even more obsolete when used to measure the satisfactory quality range in soft shell clams.

Recognizing that the Maryland-Virginia area is a problem unto itself in oysters, we can apply the same yardstick for soft shell clams. Unfortunately, I do not know of any work done in Virginia on soft shell clams so I can only refer to our work in Maryland when citing coliform scores of water over clam beds versus the dug clams. I admit that we have only done sporadic work over the past four years, but I think it shows enough results to clearly indicate the need for a revised standard for soft clams in the Virginia and Maryland areas.

One study during April of 1953 produced the following results;

EASTERN BAY

WATER MPN per 100 ml		SOFT CLAMS MPN per 100 ml	
Coliform	E. Coli	Coliform	E. Coli
0	0	1,700	40
9	4	2,200	110
43	4	18,000+	130
4	0	2,800	20
3	0	250	70
9	0	3,500	480
0	0	1,700	40
9	4	2,200	110
43	4	18,000+	130
4	0	2,800	20
3	0	250	70
9	0	3,500	480

Unfortunately we did not repeat the study of water over the clam beds versus the clams, but did do some studies regarding the advisability of floating as a method of lowering the coliform MPN. These tests, some of which are shown in table below, led us to recommend the elimination of floating because the tendency was to increase the coliform MPN and total plate count rather than decrease it.

SOFT SHELL CLAM FLOATING STUDY

Sample No.	Type Bact. Analysis	Sampled when dug	Sampled after floating 2 days	Sampled after floating 7 days	Av. MPN water at floats	Water Temp.
		MPN/100 ml.	MPN/100 ml.	MPN/100 ml.		
I	Coliform	1,100	18,000+	18,000+	24	60°F
	E. Coli	80	1,700	50	0	
	Total plate count	12,000	41,000	50,000		
II	Coliform	1,100	3,500	16,000	29	60°F
	E. Coli	80	460	50	14	
	Total plate count	12,000	9,200	9,000		
III	Coliform	1,100	18,000	18,000	9	60°F
	E. Coli	80	2,400	1,300	9	
	Total plate count	12,000	18,000	70,000		
IV	Coliform	16,000	18,000	18,000+	79	65°F
	E. Coli	3,500	2,400	230	15	
	Total plate count	5,000	8,200	64,000		

Samples of soft clams taken when the shellfish waters were 60° F or above showed a much higher coliform MPN than those taken during the winter and early spring season.

Some of my claims regarding our work on both clams and oysters seemed to be confirmed by C. B. Kelly's (5) work while he was with the New York State Conservation Department. He states "The relative intensity of coliform in shellfish and sea water is in the increasing order of sea water, oysters, hard clams and soft clams. Seasonal variation decidedly effects coliform scores in soft clams and shucked oysters, but fails to greatly effect the scores of hard clams and shell oysters."

I will readily agree that more work needs to be done on the soft clam problem before we can intelligently set another standard. However, in the meantime, I do not think shippers of soft shell clams from the Maryland and Virginia area should be expected to keep within the 230-2400 MPN.

Before getting into the question of what steps should be taken to correct existing standards, I want to make one thing plain. I do not want to see any sanitary practices relaxed when new standards are promulgated. I think there should always be the following pre-requisites to the sale of shellfish for human consumption. (1) from waters free of fecal pollution, (2) good sanitary practices in a well equipped plant, (3) proper refrigeration immediately after packing and until they are sold to the consumer, (4) satisfactory records and identification of the shellfish.

I have been doing a lot of talking about the problems of Maryland and Virginia with the present shellfish standards for coliform MPN's. I recognize also that there are other sections of this country that have shellfish difficulties peculiar to their area. Last, but not least, we have the large consuming cities and districts to consider with their problems.

Writing a set of regulations and standards to adequately and justly protect the grower of shellfish, the shellfish plant operator and the consuming public is a herculean task. I do not envy Mr. Jensen and his cohorts in the job confronting them.

In order to evoke a discussion on what methods could be used as a substitute for our old standards, I will mention three:

(A) The so-called Canadian - U. S. standards. They are:

Class 1. Acceptable Shellfish MPN of not more than 2400 per 100 ml and/or a standard plate count of not more than 50,000 per ml.

Class 2. Acceptable on Condition Shellfish with a coliform MPN of less than 160,000 per ml and/or a standard plate count of less than 1,000,000 per ml.

The U. S. P. H. S. is notified of the receipt of these shipments falling in Class 2. The oysters are accepted on the condition that the State authority concerned will conduct immediate investigations of the producers plant operations and a report of such investigations will be submitted by the U. S. P. H. S. to the Canadian Department of Health and Welfare. On the basis of this report, Canada will reject or permit further shipments from the producer in question.

Class 3. Rejectable Shellfish with a coliform MPN of 160,000 or more per 100 ml and/or a standard plate count of 1,000,000 or more per ml.

(B) Using the figures compiled by Kelly and Arcisz,(4) set a standard for shucked oysters at the plant of 2400-24,000 MPN per 100 ml and a market standard of 24,000-160,000 MPN. Reject all over 160,000 MPN.

(C) In the past the U. S. P. H. S. has designated the coliform group as an index to pollution of shellfish. We, in Maryland, do not think this group presents a true picture of existing conditions. Our work with thousands of samples over the past thirty years (2) indicates to us that Escherichia Coli plus the standard plate count would give us more factual information on fecal pollution of oysters, sanitation within the plant and the care exercised in handling the oysters until they reach the market. We find this combination quite satisfactory in our crab meat work while the U. S. Food and Drugs also has used Escherichia Coli for many years as an indicator of fecal contamination. I heartily endorse this type of standard over proposals A and B.

Time will not permit me to go into a prolonged discussion of Escherichia Coli versus the Coliform group as an index of fecal pollution, but thinking in terms of a standard I shall present the following table:

1955 MARYLAND STUDY ON ESCHERICHIA COLI AND TOTAL PLATE COUNT

SHELL OYSTERS

Number samples	E. Coli	Number samples	Total plate count per ml
72	0-50 MPN/100 ml	76	Less than 3,000
4	51-100 MPN/100 ml	12	3,000-10,000
16	Over 100 MPN/100 ml	4	Over 10,000
92		92	

SHUCKED AND PACKED OYSTERS

Number samples	E. Coli	Number Samples	Total plate count per ml
212	0-50 MPN/100 ml	230	0-25,000
22	51-100 MPN/100 ml	23	25,001-50,000
37	101-300 MPN/100 ml	35	50,001-100,000
35	over 300	18	over 100,000
306		306	

These samples were collected between October 25 and April 15 which eliminates about seven weeks of our oyster season when both the water and air temperatures are highest. I am reasonably sure if we had started our study on September 1, the average E. Coli count would be somewhat higher with the total plate count showing a greater increase in proportion to the E. Coli count. I think this table is very interesting in that it shows the majority of the shellstock samples have an E. Coli count of 0-50 MPN per 100 ml. with a total plate count of less than 3,000. In fact 45 of the 72 samples in the 0-50 category showed zero E. Coli. This is roughly 50% of the entire number in the study. Likewise the less than 3,000 does not present the true bacterial content because using a 1-100 dilution, standard methods call for a statement of less than 3,000 whenever there are less than 30 colonies on the plate. The 76 samples actually averaged a plate count of 850.

In the shucked samples, we find the majority falling in the 0-50 E. Coli MPN per 100 ml with a total plate count of less than 25,000. Remember that neither the E. Coli or total plate count are in our present standards. Therefore, you cannot get some plant operators to be too much concerned over same. I believe the 35 samples showing over 300 E. Coli and 18 showing a total plate count of over 100,000 is largely due to careless operation in the plant and the majority of them would be eliminated from these classes if there was an E. Coli and total plate count standard adopted.

I sincerely believe an E. Coli-total plate count standard would involve less confusion and be more practical over the entire oyster growing area of this country than our present coliform group standard. However, I do not expect this group to adopt a standard based entirely on the work Maryland has done.

It is my opinion there will be some increase over plant samples in E. Coli and total plate counts at the market level, especially in the early part of the oyster season when both the water and air temperatures are above 60° F.

I, therefore, suggest a committee be formed at this meeting that will get both producing states and receiving states and cities to agree on a study during the coming 1956-57 oyster season toward the adoption of an E. Coli-total plate count standard. The study to start between September 15 - October 1 with bacteriologists from the locations making the study meeting within 10 days from today to adopt uniform methods, procedures, etc. The results of this study to be forwarded to the U. S. P. H. S. by June 1, 1957 with a meeting called by the U. S. P. H. S. by July 1, 1957 to discuss the results and formulate standards.

(1) H. D. Pease - Pease Laboratories, New York City Communication to Dr. C. A. Perry

(2) C. A. Perry - A summary of studies on Pollution in Shellfish.

(3) C. A. Perry and Milward Bayliss - Escherichia Coli as an Indicator of Fecal Pollution in oysters and oyster waters.

(4) C. B. Kelly and W. Arcisz - Bacteriological Control of Oysters During Processing and Marketing.

(5) C. B. Kelly - A review of Bacteriological Shellfish Scoring (Work done in the New York State Conservation Department Laboratory)

APPENDIX H

BACTERIAL STANDARDS FOR SHUCKED OYSTERS ON THE CANADIAN MARKET

by

E. T. BYNOE

BACTERIAL STANDARDS FOR SHUCKED OYSTERS ON THE CANADIAN MARKET

Dr. E. T. Bynoe, Chief
Bacteriological Laboratories
Laboratory of Hygiene
Department of National Health and Welfare

During 1946-1949, of 77 shipments of shucked oysters imported from the U. S. into Canada and bacteriologically examined, only 34 (44.2%), less than one-half, had a coliform MPN of 230 or less, while 41.5% had an MPN in excess of 16,000 per 100 ml. These oysters had all come from shippers, approved by your public health service.

How were we, the control agency in Canada, to interpret these findings? There were no accepted bacteriological standards for shucked oysters, as offered for sale. Our only guide was the recommendation in the U. S. Public Health Bulletin No. 295, "A Manual of Recommended Practice for Sanitary Control of the Shellfish Industry", that a coliform MPN of 230 or more per 100 ml. of sample in oyster shell stock or shucked oysters at the point of shucking (with only an occasional sample showing an MPN of 2400) indicated unfavorable conditions in the production and handling of the product and called for investigation.

Were we to have accepted this standard of "230 MPN", we would have rejected for sale in Canada more than half of the shipments of shucked oysters from your country. We knew of no illness, certainly of no outbreaks of illness, following consumption of these products, and we assumed that they had all been fished from approved areas and processed in approved plants and therefore it seemed entirely impractical and unreasonable to use this standard of "230 coliforms per 100 ml. sample" as a basis for acceptance or rejection of U. S. shucked oysters. On the other hand, it seemed equally unreasonable to accept as a good, safe food a product so evidently grossly contaminated as to contain more than 16,000 coliforms per ml. of sample.

In every instance of those samples showing more than 230 coliforms per 100 ml., we were forced to make an arbitrary decision. We had no standard to go by. We would permit a shipment on one occasion with a bacterial content that on another we would consider unfit, sometimes simply because we thought one shipper more reliable than another (the former probably had a better record than the latter). This put us in a difficult position, and made it very embarrassing sometimes to defend our decisions. We badly needed some standard on which to base and by which we could justify, administratively, our decisions.

At our annual Interdepartmental Shellfish Committee Meeting in March, 1950, which was attended by Mr. Green and Mr. Kelly of the U.S.P.H.S., after considerable discussion we adopted for trial a scheme for the classification of shucked oysters, as offered for sale to the public, to be used as a working standard by the Canadian federal control agencies.

The relative merits of coliform counts and of total counts were discussed. While coliform counts were particularly valuable in assessing the bacterial quality or safety of the product as fished, there was some indication from Mr. Kelly's experience, that total counts might be a better index of plant sanitation than the coliform count. It was, therefore, decided to base our scheme of classification on both coliform and total bacterial counts.

From a limited number of examinations there appeared to be a relationship between coliform counts and total counts. As expected, under normal circumstances, clean shucked stocks had low coliform counts and low total counts, and known dirty stocks had high coliform and high total counts. The occasional specimen with a low coliform and high total count or the one with a high coliform and low total count might reasonably be considered suspicious, of doubtful purity, or even completely unfit for human consumption. On the basis of this limited experience, we set up a classification which separated market shucked oysters into three classes as follows:

Class i - Acceptable. The product to be considered acceptable if the MPN of coliform bacteria per 100 ml. of sample did not exceed 2400 and/or the standard colony count on Tryptone glucose extract agar at 35° C for 48 hours (total count) did not exceed 50,000 per ml.

Class ii - Acceptable on Condition. Products with coliform MPN's/100 ml. of 2400 to 160,000 and/or with "total counts" of 50,000 to 1,000,000 per ml. are placed in this class, to include all these products of suspicious or doubtful safety. The bacterial content of these specimens is considered sufficiently high to indicate either that the oysters have been harvested from beds of questionable sanitary quality or have been handled in an unsatisfactory manner. While such samples are of doubtful purity, it was considered by our Committee that the contamination was not necessarily dangerous enough to warrant rejection without further investigation. Hence, this class of product was accepted on the condition that the control agency in the producing State would investigate the shipper and the shipments concerned and submit a report through the U.S.P.H.S. to our Canadian department as to the reasons for these unsatisfactory bacteriological results and the remedial action taken. In the event of an unfavorable or unsatisfactory report, or no report from the control agency in the U. S., further shipments into Canada from this shipper were suspended until we had sufficient proof that he was turning out a satisfactory product.

Class iii - Rejectable. Any shipment showing, on bacteriological examination, a coliform MPN/100 ml. sample of 160,000 or more, and/or a total count of 1,000,000 or more per ml. to be rejected, as grossly contaminated and unfit for human use.

It was recognised at the time that this was a lenient standard, but it was thought to be a fairly sensible basis on which to establish a working standard and to accumulate evidence for the justification, modification or rejection of such a standard.

How has the application of this standard worked in practice? From our preliminary tests, before the adoption of this standard, it was evident that the shellfish from the more northern States of New York, New Jersey, Connecticut and Rhode Island presented a different problem, or better, presented less of a problem than the shellfish from the more southern States of Maryland, Delaware and Virginia. I mention these States in particular because only shucked oysters from these States were included in the series on which I am presently reporting.

A summary of the results of the tests for coliforms is shown in Figure 1. Prior to September 1949, the upper limits of coliform density for which we tested was an MPN of 16,000; hence, we are unable to show the percentage of samples which fell into Class iii of our provisional standard. From September 1949, we extended our tests to be able to read a coliform MPN of 160,000. This, of course, has been our routine practice since the adoption by our Federal control agency in the Spring of 1950 of the classification scheme described. In this figure is shown a further breakdown of coliform counts. In the Acceptable Class i, we have shown the percentages of those specimens with an MPN of 230 or less (A) and those with an MPN of 231 to 2400 (B). In Class ii, we show the percentages with an MPN of 2401 to 16,000 (C) and those with an MPN of 16,000 to 160,000 (D). Those samples with an MPN of more than 160,000 fall in Class iii and are shown as (E) in the figure. Because we did not carry out our dilutions far enough to give an MPN reading of 160,000 before September 1949, we have had to include these with the (D) category in the figure and call it (DE).

A few interesting observations can be made from this figure. First, the striking difference in coliform content of the oysters from the northern States and of those from the more southernly. Higher standards could be set for northern oysters. Between 45 and 75% of samples could meet the U.S.P.H.S. recommended standard for shell stock of an MPN of 230, while 75 - 90% of the samples could meet a requirement of an MPN not to exceed 2400. On the other hand, less than 10% of the samples from the more southern States could meet the "230" standard and only 15 - 40% the "2400" standard.

Are these "southern" oysters more dangerous? There is no epidemiologic evidence, of which I am aware, that they are. Hence, there would seem to be justification for the establishment of our Class ii category for those specimens with coliform MPN's of more than 2400 fished from approved areas and processed in a clean, altogether satisfactory manner. As the setting up of dual standards, one for shellfish from one group of States and one for oysters from another group of States is impractical, it seems we are forced to set as our standard one which can be met with safety by both groups.

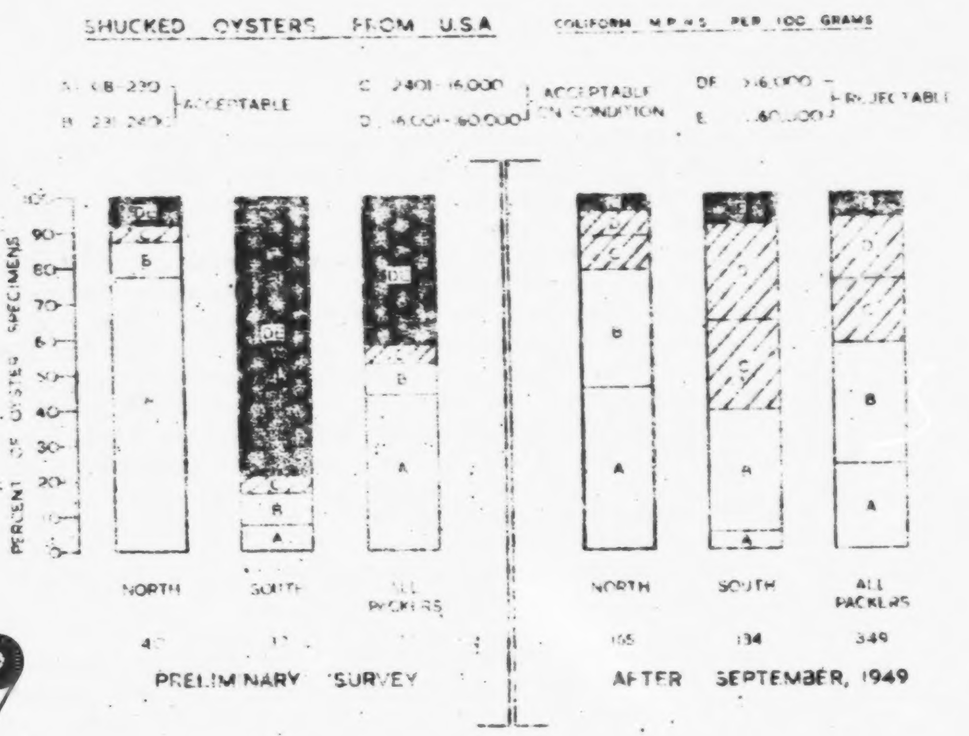
This situation also suggests that high coliform counts in oysters from the northern States are more indicative of unsatisfactory conditions than corresponding counts from oysters from the south. It also raises the question, "Might we not be able to distinguish between the coliforms of dangerous sanitary significance and those of less sanitary significance?". In other words, might our classification not be more realistically and simply based on the so-called fecal coli type - or Escherichia - index as is the practice in the U.K. rather than on the coliform index? This approach would seem to have much merit and is deserving of investigation and consideration.

Another point, illustrated in this figure, to which I would draw your attention is the marked improvement in the bacteriological quality of the shucked oysters from the South after the adoption of our classification scheme for control purposes. This was undoubtedly due to the follow-up by your control agencies of all reports from us of Class ii shipments. The liaison that has existed between our two countries through your Public Health Service and our Department of National Health and Welfare has been wonderful and something of which we might feel justly proud and happy.

One final observation, from the figure. Since adoption of this grading by our authorities, less than 10% of shipments have been rejected. The point is, could or should we raise the standard? If we set a limit of "16,000" as the upper limit for Class ii products, would we be setting an unreasonably high standard? With such a limit, we would, on the basis of past experience, reject about 25% of the shipments of U. S. shucked oysters into Canada. What is badly needed is some epidemiologic information relating coliform counts in oysters to illness in man.

Figure 2 shows the standard plate counts carried out on the specimens. Here, too, we have shown two divisions in the Class i and Class ii samples. There was fairly good agreement between the limits set for coliforms and total bacteria counts in the three classes, for the oysters from the northern States. Comparison of the classification by the two methods shows 78.1% of samples fell into Class i by coliform count and 82.3% by total count, in Class ii - 17.0% and 16.4%, respectively, and in Class iii, 4.2 and 1.2%, respectively. The agreement was less good in the oysters from the South. Of these, 39.6% were classified as Class i by coliform count, whereas 73.4% fell into this category by total count; in Class ii, the respective percentages were 52.2% and 22.8%, and in Class iii, 8.2 and 3.8%. This would suggest, again, that higher coliform counts might be permitted for the oysters from warmer waters. From an observation of these results, I think we might reasonably set our standard for total count lower than the 1,000,000 for rejection. If we set 100,000 as the limit of acceptability, we would not be asking for something unreasonable and impractical. 85% of the specimens in our series would meet this requirement. It does not seem unreasonable to expect that a food which can be produced under ordinary sanitary conditions with a total bacterial count of some few thousands should be permitted to be sold to the public containing 1,000,000 bacteria per ml.

In conclusion, a bacteriological standard for shucked oysters as sold to the consumer is highly desirable. The provisional standards adopted by the Canadian federal authorities in 1950 have proved useful. They have served to improve the quality of the products offered to the Canadian public; they have drawn attention to those shippers who are turning out a poor product and whose processes need investigation; they are, perhaps, too lenient and need to be made more stringent, and there is need for further study of the relative merits of coliforms, total counts, fecal coli (Escherichia) and perhaps fecal streptococci as bases for a bacteriological standard for the acceptance of shucked oysters as a safe food.



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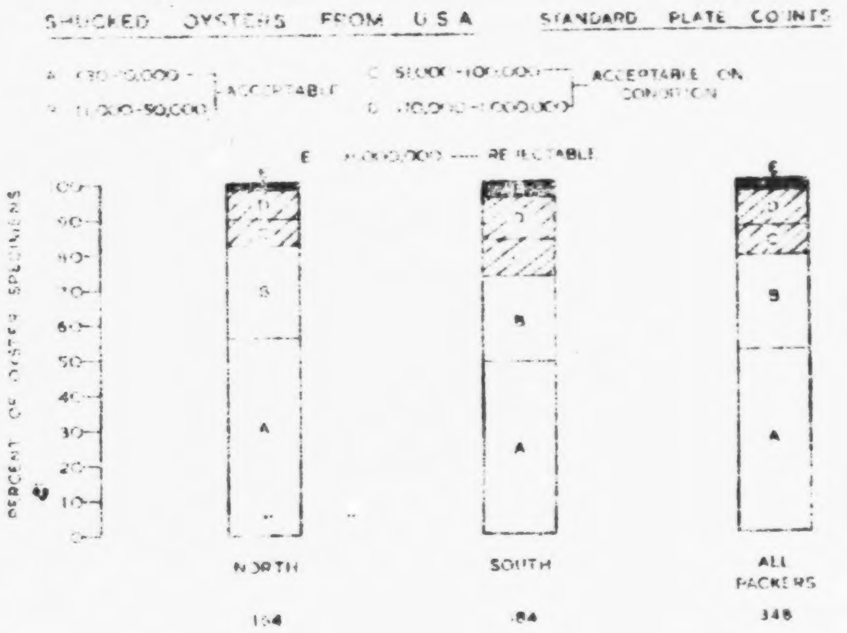

APPENDIX I

REVISION OF THE PHS MANUAL OF RECOMMENDED PRACTICE FOR SANITARY CONTROL OF THE SHELLFISH INDUSTRY

by

EUGENE T. JENSEN

REVISION OF THE PHS MANUAL OF RECOMMENDED PRACTICE FOR SANITARY CONTROL OF THE SHELLFISH INDUSTRY

Eugene T. Jensen, Chief
Shellfish Sanitation Section
Milk and Food Program
Division of Sanitary Engineering Services

Several years ago it became apparent that the Manual of Recommended Practice for the Sanitary Control of the Shellfish Industry was not entirely adequate as a basic guide for use with the cooperative State-PHS program for certification of interstate shellfish shippers. Accordingly, it was decided that a revision would be undertaken.

Several conferences were held with representatives of State and Federal agencies, and with the Canadian Department of National Health and Welfare. As a result, it was decided that the PHS shellfish sanitation manual would be rewritten in three parts, i. e., Breading and Freezing; Harvesting and Processing; and Sanitary Control of Growing Areas.

It seemed that the most urgent need was for the manual dealing with the breading and freezing of shellfish. A working draft of the manual was completed in June, 1954.

The wisdom of extending the certification system to breaded or other processed shellfish was questioned at the 1954 Conference on Shellfish Sanitation. Subsequently, it was decided that such products could not properly be included in the program. Further work on that portion of the manual was then discontinued.

An initial draft of the part of the manual dealing with shellfish harvesting and processing was circulated to all interested State and Federal Agencies and the shellfish industry in February, 1955 for comment. The draft was also discussed with representatives of many State shellfish regulatory authorities, and with the shellfish industry at a series of regional conferences. A second draft was then prepared which incorporated many of the suggested changes. This second draft was discussed with those agencies who had shown the most interest in the revision of the original draft.

On this basis a final draft of the proposed revision was prepared in April, 1956. About 400 copies were distributed to all interested State and Federal Agencies (including Canadian Agencies) and the shellfish industry, for comments.

Comments have been received from about 30 State and Federal Agencies and from the two major industry organizations, (the Oyster Institute of North America and the Pacific Coast Oyster Growers Association).

The general reaction has been favorable, and a surprisingly small number of changes have been suggested. Most of the suggested changes have been minor; however, in at least one instance a major error was pointed out.

It would be possible to incorporate these changes into a new draft for consideration by the State and Federal Agencies and the shellfish industry. This would involve the mimeographing and distribution of another four or five hundred copies of the manual and would delay its publication for at least another season. Rather than to delay publication it has been decided to review these changes at the 1956 Shellfish Sanitation Workshop and to reach a final decision on the wording for each item. This should enable us to have the Part II of the shellfish manual printed within the next month or two. If this can be accomplished the new shellfish manual, and supporting inspection form, can probably be made available for use during the 1956-57 shellfish harvesting season.

Accordingly, an item by item listing of the proposed changes has been prepared. Each change has been evaluated and recommended action has been indicated.

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1. Suggested Change, PP. 2-3, Definitions: That the definition for shell stock shippers include shell stock harvesters.

Recommendation: It is recommended that this change be made.

2. Suggested Change: That the word "sanitized" be defined.

Recommendation: The phase "cleaned and given bactericidal treatment" will be substituted for "sanitized".

3. Suggested Change: That the definition of "wet storage" used in the old manual be retained because this operation is normally carried on by plant management.

Discussion: It is agreed that this item should be included in Part II of the new manual.

Recommendation: 1. That the definition for "wet storage" be revised as follows:

"Wet Storage--The temporary storage of shellfish from approved sources, intended for marketing, in tanks containing sea water or in natural bodies of water.

2. A new item will be added to Section B as follows:

"Wet Storage. Wet storage shall not be practiced unless written approval is given each year by the State regulatory authority. This approval is to include a sketch drawn to scale on the reverse side of the interstate shippers certificate issued to the interstate shipper, and showing the approved location of the storage area or the water intake of the wet storage tanks and all the potential hazards to which the stored shellfish may be exposed. The statement shall also describe the measures taken to protect the shellfish from the potential hazards. The presence of useable wet-storage tanks in a plant shall be deemed evidence that wet storage is being practiced.

"Public-Health Reason: Removal of shellfish from growing beds to storage areas close to shore and habitations and frequently in shallow water, may subject the shellfish to constant or intermittent pollution. Shellfish in wet storage tanks are similarly subject to pollution if the water is obtained from a polluted source.

"Satisfactory Compliance: This item will be satisfied when wet storage is practiced only in strict compliance with the terms of the written approval of the State regulatory authority. This approval is to include: (1) a sketch drawn to scale on the reverse side of the certificate issued to the interstate shipper and showing the location of the storage area or water intakes and the potential hazards to which the shellfish may be exposed; and (2) a statement describing the measures taken to protect the shellfish from the above potential hazards. This written approval shall be valid for not more than twelve months."

4. Suggested Change, Page 3, Section A, Item (1), (a): That the item be rewritten to make it clear that false bottoms will ordinarily be required in small craft used in the transport of shell stock.

Experience has shown that operators do not consider water in the bottom of small boats as bilge water. It is believed that an explanatory sentence is needed.

Recommendation: It is recommended that the following sentence be added to Item 1 (a): "False bottoms will ordinarily be required in all small craft, including row boats, skiffs and power boats, used in the transport of shell stock".

5. Suggested Change, Page 3, Section A, Item 1 (c): That sacks not be accepted for shell stock storage because of the difficulties of keeping them clean.

Discussion: Limited bacteriological investigation does not show that the use of burlap sacks would necessarily result in the contamination of shell stock in storage although they obviously provide less physical protection than baskets or wooden boxes.

Recommendation: That no change be made in the item.

6. Suggested Change, Page 4, Section A, Item 1 (a) and 1 (f): That decks, bins and truck boxes be constructed of a nonporous material.

Discussion: Cleaning of boat decks, storage bins and truck boxes would be greatly facilitated if constructed of impervious material.

Recommendation: That the following sentence be added to the basic paragraph of Item 1, page 3.

> "To facilitate cleaning, it is recommended that decks, storage bins, and truck bodies be constructed of impervious material."

7. Suggested Change, Page 4, Section A, Item 2 (a): It is suggested that (1) the phrase "to a degree satisfactory to the State regulatory agency" be substituted for the word "reasonably" as indicative of satisfactory shell stock washing; and (2) the use of dip tanks for shell stock washing be prohibited because of the accumulation of dirt and silt with resulting high coliform counts.

Discussion: There is a need for simple method of determining the amount of mud or detritus remaining on shell stock. When such a method is developed it will be possible to express the degree of cleanliness of shell stock in terms of a numerical standard. Until such a technique is developed it is believed that the term "reasonably" offers a satisfactory method of evaluating shell stock washing.

Recommendation: That (1) Use of the word "reasonably" be retained in Section A, Item 2 (a), and (2) that the following sentence be added to Item 2 (a), page 4. "Dip tanks are not used for shell stock washings".

8. Suggested Change, Page 5, Section A, Item 3: That: (1) the word "should" be substituted for "shall" in regard to disposal of excreta from shellfish harvesting boats; (2) that State health authorities be given broader latitude in prescribing methods for the disposal of the contents of excreta containers; and (3) that contents of excreta containers be discharged into an approved sewerage disposal system as described in Item 10.

Discussion: There is evidence that outbreaks of enteric diseases have been caused by the disposal of excreta from shellfish harvesting boats. It is difficult to understand how a health department could approve the disposal of fresh fecal material into waters in which a food product is harvested.

The methods of sewage disposal outlined in Section B, Item 10, of this manual provide safe and adequate means of disposal and should give State regulatory authority adequate latitude in prescribing excreta disposal methods.

Recommendation: That the basic paragraph and Item 3 (e) be rewritten as follows:

> "The contents of excreta containers are disposed of by discharging into an approved sewerage disposal system (See Item 10, page 12), and when containers are cleaned before being returned to the boat."

9. Suggested Change, Page 6, Section B, Item 1: That an item be added prohibiting boxes, shelves or nails in operational parts of the plants and on which miscellaneous articles can be placed or hung.

Discussion: Item 14 (a), Section B, provides that such material shall not be kept in operational portions of the plant. If a similar provision is added to Item 1 this would result in duplicate violations which tends to complicate inspection procedures.

Recommendation: It is recommended that no change be made in this item.

10. Suggested Change, Page 6, Section B, Item 1 (a): That if plant floors are flooded, shucking be discontinued until after waters have receded and the building cleaned up.

Recommendation: It is recommended that the following sentence be added to Item 1 (a):

> "If plant floors are flooded, shucking is discontinued until after waters have receded and the building is cleaned".

11. Suggested Change, Page 6, Section B, Item 1 (b): That separate shucking and packing rooms not be required because some plants pack oysters in natural liquor.

Discussion: Bacteriological investigations of the shucking and packing procedure indicates that a substantial reduction in bacteria counts occur when the shucked shellfish are washed.

Recommendation: It is recommended that no change be made in the item as written.

12. Suggested Change, Page 6, Section B, Item 1 (c): That the requirement for curbing on the packing room delivery window be deleted since this implies ponding of water on the shelf.

Discussion: The purpose of curbing is to prevent drip or accidental splash from the delivery shelf into the packing room rather than to correct faulty delivery window shelf.

Recommendation: That no change be made in this item.

13. Suggested Change, Page 6, Section B, Item 1 (d): That an item be added which would require sufficient locker space for the storage of clothing of all employees.

Discussion: It has been observed that some plants fail to provide adequate locker space for employees' clothing and personal possessions. This results in employees keeping clothing in shucking and packing rooms.

Recommendation: That Item 1 (d) be rewritten as follows:

"Rooms or lockers are provided which have adequate capacity for storing clothing, aprons, gloves and other personal articles of employees."

14. Suggested Change, Page 7, Section B, Item 2: That the manual specifically require provision of a shell stock storage room or bin.

Discussion: It is the intention of the manual that shell stock storage areas be provided.

Recommendation: It is recommended that the following sentence be added to the basic paragraph of Item 2:

"Separate storage rooms, benches or hoppers shall be provided for the storage of shell stock".

15. Suggested Change, Page 7, Section B, Item 2: That a new item be added which would prohibit the presence of domestic animals or rodents in the shell stock storage area.

Discussion: The presence of domestic animals and/or rodents is covered in Section B, Items 11 and 14. Inclusion in this item would result in dual violations on inspection forms, and therefore is undesirable.

Recommendation: It is recommended that no change be made.

16. Suggested Change, Page 7, Section B, Item 2 (b): That this item be rewritten to accept wood construction of walls in shell stock storage rooms and hoppers.

Discussion: Substantial wooden construction in shell stock hoppers and walls of shell stock rooms has been generally satisfactory and should be accepted as satisfactory compliance.

Recommendation: It is recommended that Item (b) be rewritten as follows:

> "Walls of shell stock storage rooms and hoppers are smooth, and of material which will not deteriorate under repeated washing (use of impervious material is recommended wherever possible)."

17. Suggested Change, Page 7, Section B, Item 2 (c): It is suggested that indirect floor drains in shell stock storage rooms be provided. This would protect stored shell stock against possible sewage contamination resulting from stoppage in a sanitary sewer.

Discussion: This is a very reasonable requirement. Similar protection is required by Items 9.1 through 9.5 of the Report of the Coordinating Committee for a National Plumbing Code.

Recommendation: It is recommended that (1) the following sentence be added to the basic paragraph of Section B, Item 2:

> "Floor wastes from a shell stock storage area shall either be discharged through a separate drainage system, or if discharged into a general drainage system carrying sanitary wastes, an air gap shall be provided."

(2) The following sentence be added to Section B, Item 2 (c):

> "Shell stock storage areas are protected against sewage back floor through the installation of an air gap in the waste line or by provision of a separate drainage system."

18. Suggested Change, Page 7, Section B, Item 2 (d): It has been suggested that conveyances used for the transport of shell stock be of easily cleanable construction.

Recommendation: It is recommended that Item 2 (d) be rewritten as follows:

> "Conveyances or devices to be used in the transportation of shell stock within processing plants are so constructed that they may be easily cleaned and are kept reasonably clean (Use of impervious material is recommended wherever possible).

19. Suggested Change, Page 8, Section B, Item 5 (a): That shell stock storage rooms be protected against the entrance of flies.

Discussion: 1. The public health need for such protection is questionable since it is unlikely that the shellfish meat could be contaminated by flies.

2. A requirement for screening of shell stock storage rooms would be practically unenforceable in many instances and the requirement would thus have little meaning.

Recommendation: It is recommended that no change be made in the item as written.

20. Suggested Change, Page 8, Section B, Item 5 (d): It is recommended that fly control measures, other than screening, be approved by the State Health Department.

Recommendation: It is recommended that the following sentence be added to Item 5, (d):

> "Such measures should be approved by the State regulatory authority. Residual or space sprays should be used with caution to avoid contamination of the product."

21. Suggested Change, Pages 8 and 9, Section B, Item 6: (1) That the adequacy of lighting intensity be left to the judgment of the sanitarian except that the overall illumination level of 10 foot candles should be required.

(2) It is questioned if light intensity is to be measured as reflected or incident light.

Discussion: It is believed that additional light is needed on working surfaces in packing rooms, shucking benches and storage areas. The use of numerical values helps to eliminate arguments as to the adequacy of lighting.

Light measurements are, of course, approximations, and the values should not be applied too strictly.

Recommendation: It is recommended that the following be added to the Table on page 9:

(Footnote to Foot-Candles of Illumination) "Approximate--measured as incident light)".

22. Suggested Change, Page 11, Section B, Item 9, (h): That toilet rooms preferably not open directly into shell stock storage, packing, or shucking rooms.

Discussion: We do not believe that there is public health justification for such a requirement when adequate fly control measures are used, and when toilet room doors are self-closing and tight fitting.

Recommendation: It is recommended that no change be made in the item as written.

23. Suggested Change, Page 12, Section B, Item 9 (k): That the specified 5 foot candle level of illumination for toilet rooms be dropped.

Discussion: The precise level of illumination in toilet rooms is obviously unimportant. However, it is generally agreed that toilet rooms should be well lighted. Specifying an absolute level of lighting helps to eliminate arguments as to whether a room is, or is not, well lighted.

Recommendation: It is recommended that no change be made.

24. Suggested Change, Page 12, Section B, Item 9 (l): That fewer water closets be required.

Discussion: The number of water closets required would normally be determined by the applicable State laws. The table is based upon the Report of the Coordinating Committee for a National Plumbing Code and would apply only in the absence of such laws.

Recommendation: It is recommended that no change be made in the number of water closets required.

25. Suggested Change, Page 12, Section B, Item 9 (1): That separate toilet facilities for each sex not be required for plants with less than 10 employees.

Discussion: Separate toilet facilities are not now required for family shucking plants. In several areas of the country small plants are essentially family operations but may, on occasion, employ a few persons who are not members of the family. There seems to be no justification for requiring separate toilet facilities in such cases.

Recommendation: It is suggested in the last line in the basic paragraph of Item 9 and of Item 9 (1) be rephrased to eliminate the need for separate toilets for each sex where the plant has a total employment of less than 10.

26. Suggested Change, Page 13, Section B, Item 10 (b): It is suggested that this item specifically require that privies be fly tight and have tight fitting, self-closing doors.

Discussion: Tight fitting self-closing doors and fly tight construction of privies are both mentioned in the reference publication. We believe that there is no need for repeating the provisions of this publication in the shellfish manual.

Recommendation: It is recommended that no change be made in this item.

27. Suggested Change, Page 14, Section B, Item 12 (b): That center drains for shucking benches that are sloped to drain to a central outlet be accepted.

Discussion: With a shucking bench of this type the drain outlet is ordinarily covered by shell stock. When stoppage of the drain occurs water will back up and pool in the depressed part of the shucking table.

Recommendation: It is recommended that no change be made in this item.

28. Suggested Change, Page 14, Section B, Item 12 (c): That use of wood stabbing blocks be prohibited and that hard rubber or other similar material be substituted.

Discussion: It is agreed that wooden stabbing blocks are very difficult to keep in a sanitary condition. We have urged that other materials be used wherever possible. However, a completely satisfactory substitute for wooden stabbing blocks has not yet been found.

Recommendation: It is recommended that no change be made in the item at this time.

29. Suggested Change, Page 14, Section B, Item 13 (a): That (1) Ordinary shucking knives with wooden handles not be considered as meeting the construction specifications of this item; and (2), the use of dip buckets be completely prohibited.

Discussion: The only practical knife available for oyster shucking has a wooden handle. Until a knife of better construction can be obtained we will have to accept these as satisfactory compliance. The use of dip buckets should certainly be discouraged whenever possible since it is known that the water in the buckets will have exceedingly high bacteria counts. Alternatives to the dip bucket have been proposed at the request of the shellfish industry for those instances where some form of hand washing is necessary.

Recommendation: It is recommended that: (1) the word "knife" be deleted from Item 13 (a), page 14; and (2), the following paragraph be substituted for Item 20 (d), p. 23, "The use of dip buckets is prohibited. (Where conditions dictate the need for frequent rinsing of the shuckers' hands and knife, it is recommended that water outlets be installed at the shucking bench and convenient to each shucker, or that a flow-through type of dip bucket, in which the water is continually replaced by clean tap water, be installed)."

30. Suggested Change, Page 14, Section B, Item 13 (b): That non-food product zones of equipment also be constructed so as to be easily cleanable.

Discussion: It is apparent that utensils and equipment used in shellfish processing plants should not be so constructed that they would harbor an accumulation of dirt or organic matter even in non-food product zones.

Recommendation: It is recommended that the following sentence be added to Item 13 (b):

> "Non-food product zones of equipment should be so constructed that they can be kept in a clean, sanitary condition; seams and joints should be welded whenever possible; outside seams should be welded or filled with solder; and, there should be no inaccessible spaces in which dirt or organic material might accumulate".

31. Suggested Change, Page 15, Section B, Item 13 (e): That welded tubular or pipe construction be recommended for all equipment; that coved or rounded corners have an internal radius of at least 1 inch and that sanitary plug type valves be recommended.

Recommendation: 1. That an internal radius of at least 1/4" be substituted for the 1/8" radius now provided by item (e). This is in accord with presently used 3A standard for milk equipment.

2. That emphasis not be placed on any particular type of valve because of varying methods of constructing blowers.

32. Suggested Change, Page 14, Section B, Item 13 (e): That additional information on the sanitary construction of blowers and auxilliary equipment be provided.

Discussion: The sanitary construction of blowers should not differ from other shellfish processing equipment. It is hoped that it will be possible to develop more specific instructions for the fabrication of blowers and other equipment in the near future in accord with the recommendations of the Association of State and Territorial Health Officers. Such standards might parallel the 3A standards now in use by the milk industry.

Recommendation: It is recommended that: (1) no change be made in the satisfactory compliance items; and, (2) the following paragraph be added to Public-Health Reason:

> "The slime and foreign material which accumulates in blower air pipes below the liquid level affords an excellent breeding place for bacteria. This material may be dislodged and forced into the batch of shucked shellfish then in the blower, thus increasing the bacterial content of the shellfish".

33. Suggested Change, Page 16, Section B, Item 14 (c): That the word "domestic" be deleted from this item.

Discussion: The item is aimed primarily at excluding dogs and cats from shellfish processing establishments. A separate item on rodent control is included.

Recommendation: It is recommended that no change be made in the item as written.

34. Suggested Change, Page 16, Section B, Item 14 (f): That it is unrealistic to prohibit shuckers in very small plants from entering a shucking room since, in many instances, one of the shuckers will act as the operator of the packing room.

Discussion: The noted condition has been observed in many small plants and some provision should be made to accept it.

Recommendation: It is suggested that the following sentence be added to Item 14 (f):

> "(An exception may be made in small operations where an employee may work in both the packing room and the shucking room. In such cases the employee should be required to change aprons and wash his hands thoroughly before entering the packing room)."

35. Suggested Change, Page 16, Section B, Item 15: It has been suggested that this item does not give clear-cut information on the facilities which are necessary for cleaning of utensils and equipment.

Recommendation: It is recommended that the following 3 paragraphs be added to the Public Health Reason:

"The determination of adequate clean-up facilities will depend upon the method of bactericidal treatment selected (see item 16 below) and plant-by-plant determination of what equipment and utensil may best be washed in a sink and what equipment may best be washed 'in place'. Detergents and brushes, including special brushes that may be needed for cleaning special equipment such as blower lines, should be available.

"Sink Washing

"Wash sinks should be made of impervious, non-toxic material. Sink compartments should be large enough to permit the complete immersion of the largest utensil to be sink washed. A second compartment should be provided in the sink for clean water rinsing between washing and bactericidal treatment unless some other acceptable method such as spray rinse is provided. In the case of bactericidal treatment by immersion in hot water, item 16 (a) (2), both the bactericidal treatment and rinse may be accomplished simultaneously in the 2nd compartment. If bactericidal treatment by means of immersion in chemical solutions, item 16, (a) (3), is selected, a separate compartment should be provided for this operation.

Number of Compartments Required in Sink

Method of Bactericidal Treatment	Method of Rinse	
	Immersion	Spray
1. Steam Cabinet	2	1
2. Hot Water (170° F.)	2	Not applicable
3. Bactericidal Solution	3	2

In-Place Washing

"Utensils and equipment which have to be washed 'in-place' will require the same three steps of wash, rinse, and bactericidal treatment. A water tight container is best washed by preparing a solution of the detergent in the container itself and using this to scrub all parts of the unit. Rinsing should preferably be accomplished either by completely filling or by thorough spray rinse. The bactericidal treatment methods are described in item 16 below."

36. Suggested Change, Page 16, Section B, Item 15 (a): It is suggested that the two hour limitation on clean-up time be deleted.

Discussion: Experience in inspection of shellfish processing plants has indicated that it is desirable to place a time limit on clean-up operations. Mud dries quickly and if clean-up is delayed it is made much more difficult.

Recommendation: It is recommended that no change be made in the time limitation.

37. Suggested Change, Page 16, Section B, Item 15 (b): It is suggested that shucking blocks and shucking benches be given bactericidal treatment after each day's operation rather than once a week.

Discussion: The shucked shellfish do not ordinarily come into contact with either the shucking blocks or shucking benches so it is difficult to believe that daily bactericidal treatment would result in significant improvement of the sanitary quality of the shucked shellfish. However, it is believed that the item might be rewritten somewhat to indicate the need for thorough cleaning.

Recommendation: It is recommended that the item be rewritten to require that all equipment, utensils, and work surfaces be thoroughly cleaned with hot water and detergent within two hours after the day's operations have terminated.

38. Suggested Change, Page 17, Section B, Item 15 (g): That shucking and packing room equipment be flushed periodically during the work day.

Discussion: Periodical rinsing of utensils, shucking tables, and other plant equipment would undoubtedly be beneficial and should result in lower bacterial counts in the final product.

Recommendation: It is recommended that the following sentence be added to Item 15 (g):

> "Periodic clean-water flushing of shucking benches, utensils, table surfaces, and other equipment during working periods is recommended".

39. Suggested Change, Page 17, Section B, Item 15 (g): It is suggested that holding containers used in packing rooms be flushed or spray rinsed with tap water after each emptying.

Recommendation: This suggestion should be adopted.

40. Suggested Change, Page 18, Section B, Item 16 (a): That additional information be given on the bactericidal treatment of blowers.

Recommendation: It is recommended that the following paragraph be added to Item 16 (a) (2):

> "In the bactericidal treatment of blowers by this method the blower may first be filled with water and then brought up to 170° F. by the addition of steam. This temperature should be checked by the indicating thermometer and the two minute contact period measured after reaching this value. In practice it has been found desirable to provide a connection to, or a removable section in, the blower line above the liquid level of the tank, where steam or hot water can be introduced."

41. Suggested Change, Page 19, Section B, Item 16 (b): That the provision permitting bactericidal treatment of large equipment immediately before starting each day's operation be deleted.

Discussion: Some items of equipment cannot be readily protected against recontamination because of their size or construction. In such instances it is believed that greater public-health protection is afforded through bactericidal treatment of equipment immediately before start of the day's operation. This procedure is used successfully by milk plants with large equipment items.

Recommendation: It is recommended that no change be made in this item.

42. Suggested Change, Page 18, Section B, Item 16 (a): That the hot air method of providing bactericidal treatment be deleted since it is ineffective unless utensils and equipment were moist when placed in the cabinet.

Discussion: This method of sterilizing equipment is not generally used in the shellfish industry and could therefore be deleted from this manual. The fact that utensils would normally have to be moist if the process is to be effective would further indicate that it is not a satisfactory bactericidal treatment process for use by operators of shellfish shucking plants.

Recommendation: It is recommended that this item be deleted.

43. Suggested Change, Page 20, Section B, Item 18: That State licensed shellfish harvesters not be accepted as a satisfactory source of shellfish since licensing alone does not insure harvesting of shellfish from clean areas.

Discussion: The provision was written for those regions where shucking plant operators purchase shell stock from individual harvesters. Although such harvesters are not included in the certification program, they should be subject to control by the State shellfish regulatory authority. However, as written, the item would seem to indicate that the licensed shellfish harvester might not necessarily have to obtain the shellfish from an approved growing area.

Recommendation: It is recommended that part (b) "A State licensed shellfish harvester" be deleted.

44. Suggested Change, Page 21, Section B, Item 19: That the item refer to the possible need for refrigeration of shell oysters under some conditions.

Discussion: The SEC Shellfish Laboratory has undertaken an investigation of the increase in bacteriological counts of Southern oysters during harvesting, storage and processing.

Recommendation: It is recommended that the following paragraph be added under Public-Health Reason of item 19 but that no specific requirements for the refrigeration of shell stock oysters be added until positive information on the public-health significance of such increases can be obtained.

> "Significant increases in coliform counts in shell oysters stored overnight may also occur under some conditions. Preliminary investigations of such increases in southern oysters have been undertaken by the Public Health Service Shellfish Sanitation Laboratory.
>
> "The public-health significance of the increase in bacteriological counts has not yet been evaluated. It is not known if a comparable increase in *Salmonella* or other pathogenic organisms would take place."

45. Suggested Change, Page 23, Section B, Item 20 (f): That shucked shellfish not be held on the shucking bench for more than one hour.

__Discussion:__ An absolute requirement that shellfish not be held on the bench for more than one hour would be virtually impossible to enforce with present methods of shucking. However, the industry has agreed that the two hour value is realistic and could be put into effect without undue hardship. The one hour requirement would be most troublesome where bench grading is practiced since this would require that all shucking containers be delivered to the packing room at the end of the one hour period. This would result in congestion at the packing room delivery window. It would also complicate bookkeeping since fractional parts of gallons would be delivered.

__Recommendation:__ It is recommended that the item as written not be changed.

46. __Suggested Change, Page 22, Section B, Item 20:__ That the total elapsed time between shucking and attainment of a 50° F. temperature be reduced.

__Discussion:__ The present requirement represents about the minimum time of cooling attainable under present methods of operation. Any substantial reduction in cooling time would require an almost complete revision of plant operating procedures. We do not believe there is sufficient public-health justification for demanding such action at this time.

__Recommendation:__ It is recommended that no change be made.

47. __Suggested Change, Page 23, Section B, Item 21:__ That conveyances used for shell removal be cleaned before being returned to the shucking room.

__Discussion:__ Periodic cleaning of conveyances used for removal of shell would undoubtedly be helpful in maintaining plants in a sanitary condition. However, it is not believed that cleaning could be justified oftener than once a day.

__Recommendation:__ It is recommended that no change be made in this item.

48. __Suggested Change, Page 24, Section B, Item 22 (b):__ That all single service containers be rinsed and given bactericidal treatment prior to filling.

__Discussion:__ Limited bacteriological investigations have shown that the glass and metal containers as fabricated have very low bacterial counts. It is doubtful if any additional public-health protection would be afforded by bactericidal treatment of all containers. However, there is a great need for completely satisfactory storage facilities for single service containers. If such facilities cannot be provided, the only alternative will be rinsing and bactericidal treatment of each container.

Recommendation: It is recommended that no change be made in the item as written. However, if the shellfish industry will not provide satisfactory storage for single service containers, and handle them in such manner that contamination is avoided, it will be necessary to require bactericidal treatment.

49. Suggested Change, Page 25, Section B, Item 23 (f): That the following be added to item 23 (f):

> "The name and address and certificate number are on the jacket of the container unless the package is positively sealed in which case a part or all of this required information may be on the lid or label."

Discussion: A requirement of this nature would prohibit the use of the crimp type closure in use on the West Coast, and the pint glass containers used on the Gulf Coast. There is no evidence that either of these containers or closures has been unsatisfactory. In the case of gallon containers, which may be sold to restaurants or institutions, it is recommended that the identification information be placed on the side wall of the container since the tops may be cut out and discarded.

Recommendation: It is recommended that no change be made in this item.

50. Suggested Change, Page 25, Section B, Item 23 (f): That a minimum size of lettering on shellfish shipping containers be specified.

Discussion: In view of the many types of containers which are used for shipping shucked shellfish, it would be difficult to specify a minimum size of lettering which would be suitable under all conditions. Specification of a minimum size of lettering which might be used on 4 fluid oz. container would be undesirable for a gallon container. In addition to size of lettering it would also be necessary to specify the type style and color contrast.

Recommendation: It is recommended that the decision as to whether a number is easily "visible" be left to the discretion of the State Inspecting Authority.

51. Suggested Change, Page 26, Section B, Item 23: That the entire item dealing with dating of fresh and/or frozen shellfish be deleted.

Discussion: It is believed that little public-health protection is afforded through code dating of non-frozen shellfish, although the information is helpful in interpreting the results of bacteriological examination at the market level. Since frozen shellfish may be stored for long periods of time, code dating would be helpful in establishing the origin of any given shipment.

Recommendation: It is recommended that no change be made in the item as written.

52. Suggested Change, Page 26, Section B, Item 24: That an item be added which would require that frozen shellfish be kept continuously frozen until delivery to the consumer.

Discussion: Such control is undoubtedly desirable but could not be provided through the administrative mechanism of the cooperative program for certifying interstate shellfish shippers.

Recommendation: It is recommended that such a provision not be added.

53. Suggested Change, Page 27, Section B, Item 25: It is suggested that all ice be handled as if it were to be used for direct cooling of shucked stock, and that special washing facilities for ice be required.

Recommendation: 1. It is recommended that Item 25 be rewritten as: "Ice shall be obtained from a source specifically approved by the State regulatory agency and shall be stored and handled in a clean manner." and (2) that a new item 25 (c) be added: "Ice, other than that manufactured in the shellfish processing establishment, is washed before use. Special facilities including a metal wash table and spray hose should be provided".

54. Suggested Change, Page 30, Section B, Item 29 (d): That an acceptable means of disinfecting of hands be inserted.

Recommendation: It is recommended that Item (d) be rewritten as follows:

> "Sanitized rubber gloves are worn or the hands are washed clean and rinsed with an effective bactericidal solution immediately before any manually handling of the shucked shellfish. A bucket or pan of the bactericidal solution should be present in the packing room during periods of operation."

55. Suggested Change, Page 28, Section B, Item 29 (e): That only waterproof cots or shields be accepted as satisfactory compliance.

Discussion: Cots, gloves, and shields are worn primarily to protect the shucker's hands from the rough shells but may come into contact with the shucked shellfish. The present item recommends the use of waterproof finger cots and shields.

Recommendation: It is recommended that no change be made in this item.

APPENDIX J

ATTENDANCE AT 1956 SHELLFISH SANITATION WORKSHOP

ATKINS, C. H.
Public Health Service

BETZOLD, Curtis W.
Department of the Army

BOWERS, James Paul
Public Health Service

BROWN, Robert M.
Maryland State Dept. of Health

BYNOE, Evan T.
Department of National Health and Welfare, Canada

BYRD, George Clifford
National Fisheries Institute

CALDWELL, Neil McKelthen
N. C. State Board of Health

CALVELLI, Vincent P.
New York City Dept. of Health

CARLEY, George
Public Health Service

COOK, Charles E.
Florida State Board of Health

DIBATTISTA, Raymond E.
Pennsylvania Dept. of Health

ELIA, Charles V. L.
Department of the Army

FAULKNER, John D.
Public Health Service

FLETCHER, Cecil Cyril
Public Health Service

FORTGANG, Albert
New York City Dept. of Health

GIRARD, John G.
Washington State Dept. of Health

GOODEN, Donald Ray
Department of the Navy

GREGORY, Robert H.
Virginia State Dept. of Health

HARRIS, Eugene Klau
Public Health Service

HERZIK, Gus R., Jr.
Texas State Health Department

HOBBS, Lewis Franklin
Maryland State Dept. of Health

HOENSCHEIDT, Robert F.
Department of the Navy

HOMANS, Ross E.
Canada Department of Fisheries

JACKSON, Charles E.
National Fisheries Institute

JARRETT, J. M.
N. C. State Board of Health

JENSEN, Eugene T.
Public Health Service

KAVANAUGH, W. D.
American Cyanamid Co.

KELLY, C. B.
Public Health Service

KIRK, J. Kenneth
Food and Drug Administration

LEE, Charles F.
U. S. Fish and Wildlife Service

LENERT, Louva G.
Georgia Dept. of Public Health

LITTLEFORD, Robert A.
University of Maryland

MACOMBER, Ronald G.
Public Health Service

McGINNES, Tom Dix
Virginia Seafoods, Inc.

MARK, Richard S.
Public Health Service

MEREDITH, Eugene C.
Virginia State Dept. of Health

MILES, Wm. F.
J. H. Miles and Company

MORGAN, Cranston
W. F. Morgan and Son

NEURAUTER, Lloyd J.
Department of the Air Force

PEARSON, James C.
Food and Drug Administration

PIERCE, Elliot S.
American Cyanamid Co.

PRINGLE, Somers B.
S. C. State Board of Health

RILEY, Chris H.
New Jersey Dept. of Conservation

RUTH, Milton
New Jersey Dept. of Health

SCALERA, Mario
American Cyanamid Company

SHANHOLTZ, Mack Irvin
Virginia State Dept. of Health

SHEA, Walter J.
Rhode Island Dept. of Health

SLOCUM, Glenn G.
Food and Drug Administration

SPATH, Leo W.
Louisiana State Health Dept.

TAYLOR, Harold C.
Public Health Service

TAYLOR, Worthen H.
Mass. Dept. of Public Health

THIEL, John F.
Department of the Army

TREAKLE, Harman C.
Irvington Packing Co., Inc.

UDELL, Harold F.
N. Y. State Dept. of Conservation

UPHAM, Sidney D.
American Cyanamid Co.

WALLACE, David H.
Oyster Institute of North America

WATSON, William H., Jr.
Dept. of the Air Force

WESTON, William
S. C. State Board of Health

WOODFIELD, William R.
Woodfield Fish and Oyster Co.